

HP Performance Optimized Datacenter 20c User Guide—International

Abstract

This guide is intended for the person who operates and maintains the HP Performance Optimized Datacenter 20c (HP POD 20c).



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Overview

Before you begin

For more information on site requirements, specifications, power requirements, management requirements, and supported facility connections, see the *HP Performance Optimized Datacenter 20c Site Preparation and Requirements Guide*.

This guide is part of the core documentation for the HP POD 20c. The actual location of various components or included subsystems and their operation in your HP POD 20c might vary from what is described in this document. For information specific to your HP POD 20c, see the drawings included in the *Operations and Maintenance Manual for the HP Performance Optimized Datacenter 20c*, or contact HP.

Operator safety

The HP POD 20c is not suitable for long-term human occupancy. The HP POD 20c is Listed as a Product that provides service access areas for periodic maintenance and service. These areas must be used only by owner-authorized and qualified personnel who are trained in the maintenance and service of the HP POD 20c components.

-
-  **WARNING:** To avoid the risk of personal injury or loss of life, all personnel must comply with PPE requirements when opening or working inside areas of the HP POD 20c that are marked as hazardous voltage, in accordance with NFPA 70 (NA) and IEC (EMEA and APJ).

 -  **WARNING:** To avoid the risk of personal injury, hearing protection must be worn at all times when working inside the HP POD 20c.

 -  **WARNING:** To avoid the risk of personal injury or damage to the equipment, do not insert anything inside the electrical busways, except for the approved HP busway drop boxes.
-

Before completing the HP POD 20c, the customer, or a designated agent, is responsible for completing any Environmental Health and Safety evaluation of the HP POD 20c or any attached structural component purchased through HP. The customer must complete an arc flash assessment of the HP POD 20c and the associated electrical supply system for operation, maintenance, and so on.

Component safety

-
-  **CAUTION:** If the HP POD 20c is shut down for an extended period of time, such as during routine maintenance, use desiccant units or materials to eliminate condensation within the HP POD 20c. Condensation causes damage to IT equipment and HP POD 20c controls.

 -  **CAUTION:** Electrostatic discharge might damage electronic components. Be sure that you are properly grounded (earthed) by wearing approved grounding straps before beginning any installation procedure or repair.
-



CAUTION: If any racks contain empty RU space, use the HP POD 20c filler panels to maintain the efficiency of the HP POD 20c thermal system. Filler panels are available from HP in 10-pack quantities (part number AQ682A) and 100-pack quantities (part number AS993A).

Fire detection and suppression

The fire suppression system, supplied as an optional component for the HP POD 20c, is a "Manufacturer Designed" system specifically designed for this HP product, in compliance with national standards.

The HP standard suppression system includes a Novec 1230 clean agent system. However, if the customer or local Authorities require specific modifications or a replacement, HP can assist in these actions at the expense of the customer.

HP does not certify that the fire suppression system that is installed in the HP POD 20c meets all local and jurisdictional requirements. The customer is responsible for the following actions as related to the fire suppression system:

- Verifying that the POD suppression system meets local codes, including specific local requirements for initial and periodic inspections
- Arranging for and receiving all required local permits, including initial commissioning as well as standard and repair maintenance
- Arranging for the connection of the agent tanks, refilling of tanks, and all system testing, including pressure tests. All general maintenance of the suppression system must be completed by an authorized technician.

Additional local requirements are not covered as part of the option price or basic installation and deployment services, unless specifically included in an executed Statement of Work.

Environmental considerations

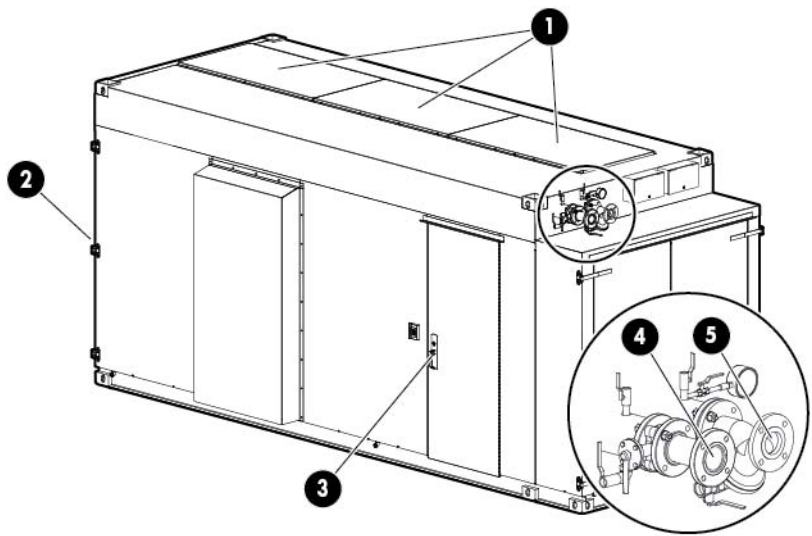


CAUTION: To maintain accurate environmental conditions and minimize condensation inside the HP POD 20c, do not leave the HP POD 20c doors open during operation.

Component identification

Structural component identification

The HP POD 20c documentation frequently refers to the specific components of the HP POD 20c as shown in the following figure and described in the following table.

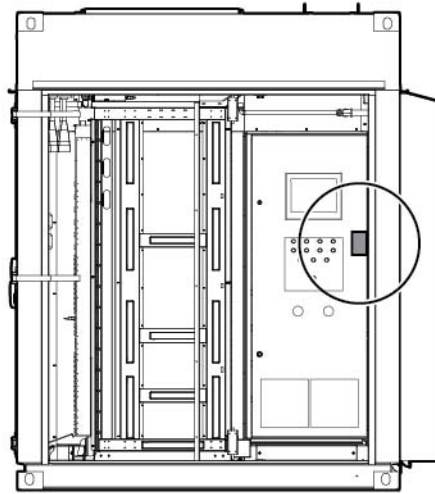


Item	Component	Description
1	Heat exchanger access hatches	Enables access to the overhead heat exchangers
2	Emergency egress door	Provides access to the POD in the event of an emergency
3	Personnel access door	Provides access to the POD
4	Facility chilled water return	Facilitates the return of chilled water to the POD
5	Facility chilled water supply	Facilitates the supply of chilled water to the POD

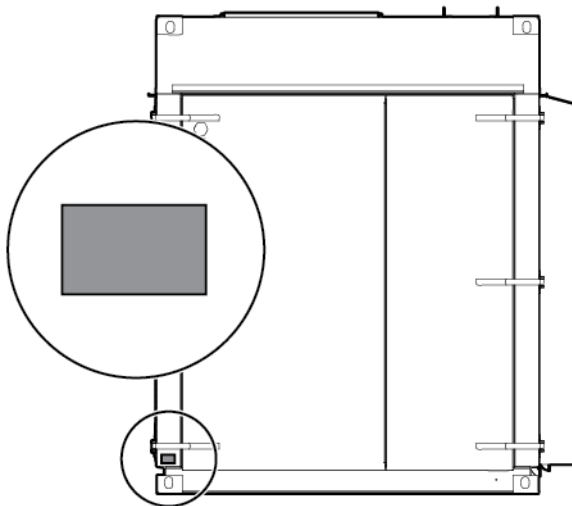
Parts and part number identification

Review the contents of the HP POD 20c to identify the following for each component:

- **Model number**—The model number is located adjacent to the door to the control panel inside the cold aisle of the HP POD 20c, as shown in the following figure.



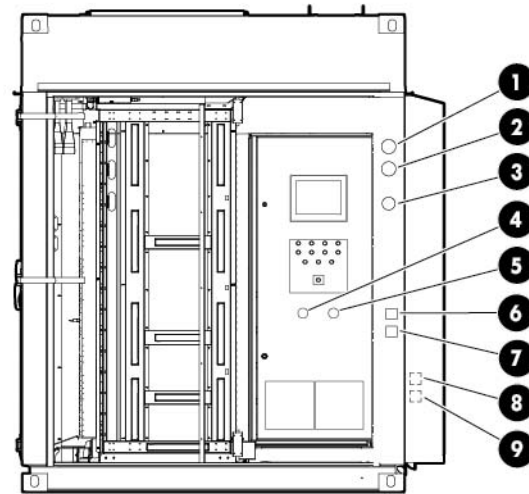
- **CSC Safety Approval placard**—Each HP POD 20c has a CSC Safety Approval placard that includes the model number, serial number, and proof load. The CSC Safety Approval placard is located on the cargo end of the HP POD 20c, as shown in the following figure.



Life safety component identification

Internal life safety components

End view shown



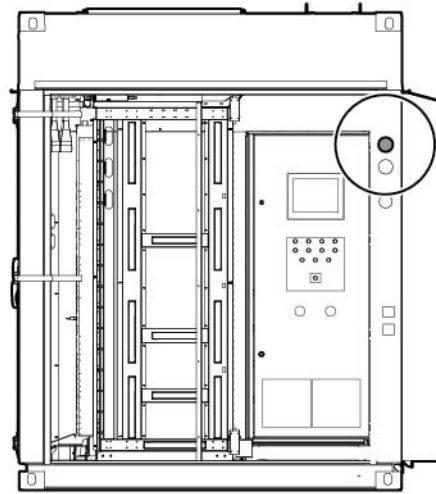
Item	Component	Description
1	Fire strobe light	Indicates a fire alarm condition within the HP POD 20c
2	Fire horn	Indicates a fire alarm condition within the HP POD 20c
3	EPO strobe	Amber—An EPO event occurred and the HP POD 20c shut down
4	ECS power switch	Turns the main power to the 24V ECS system off and on
5	Main light switch	Turns power to the HP POD 20c lights off and on
6	Fire alarm manual button	Enables manual initiation of the fire system, which includes activating the interior and exterior fire strobe lights and the optional fire suppression system
7	Fire suppression abort button*	Aborts the fire suppression system. A fire suppression abort button is located next to each personnel door.
8	Fire alarm manual button	Enables manual initiation of the fire system, which includes activating the interior and exterior fire strobe lights and the optional fire suppression system
9	Fire suppression abort button*	Aborts the fire suppression system. A fire suppression abort button is located next to each personnel door.

*This is an optional component that might not be included.

Internal emergency status indicators

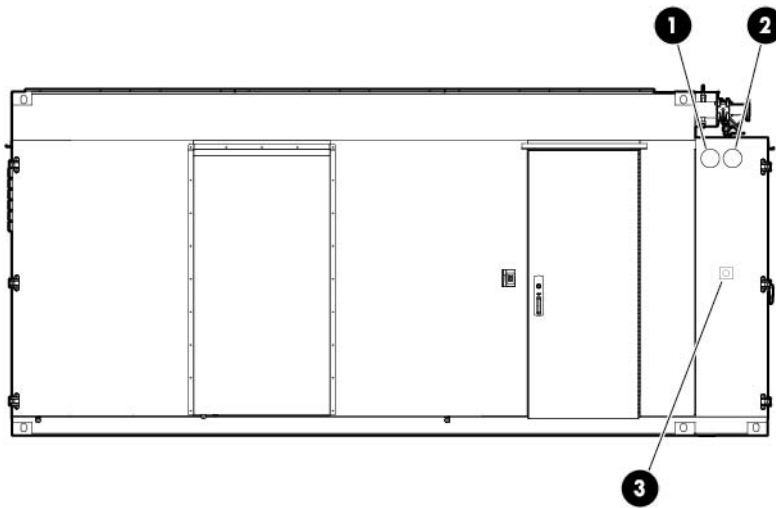
The HP POD 20c has one fire strobe light that indicates a fire alarm condition.

End view shown



External life safety components

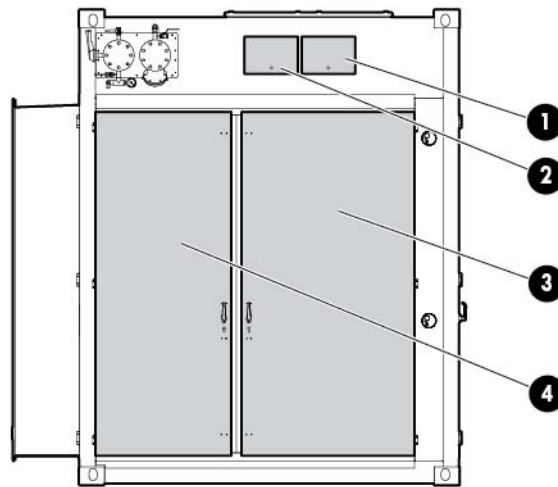
Side view shown



Item	Component	Description
1	Fire strobe light	Indicates a fire alarm condition within the HP POD 20c
2	Fire horn	Indicates a fire alarm condition within the HP POD 20c
3	Optional EPO button	Manually triggers an EPO shutdown within the HP POD 20c

Electrical power component identification

Front view shown



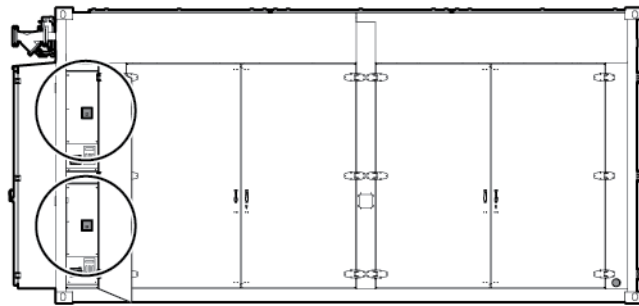
Item	Component	Description
1	Demarcation box ¹	Customer communication connection point for the following components: • ECS • Access control • Phone
2	Fire box ¹	Connection location for fire emergency and VESDAnet signals
3	480/415 transformer cabinet ²	Converts main power from 480V to 415V for POD operation
4	380-415 VAC WYE, 3-phase, 320 A	Feed A and B power for IT critical loads busways and house power

¹The demarcation box and the fire box are communication data points that are provided on the POD by HP. Connecting these data points is the responsibility of the customer, unless an approved Statement of Work is initiated.

²This cabinet is designed for two transformers. The transformers are an optional component that might not be included.

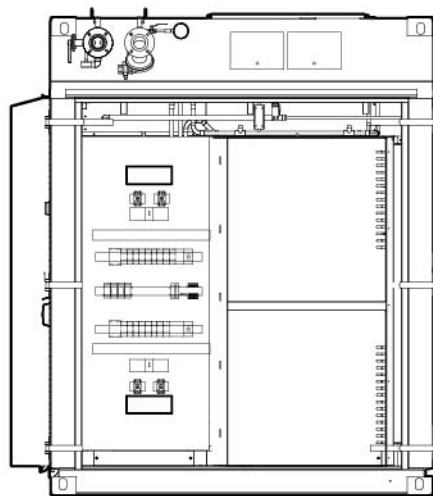
Main breaker locations

Side view shown



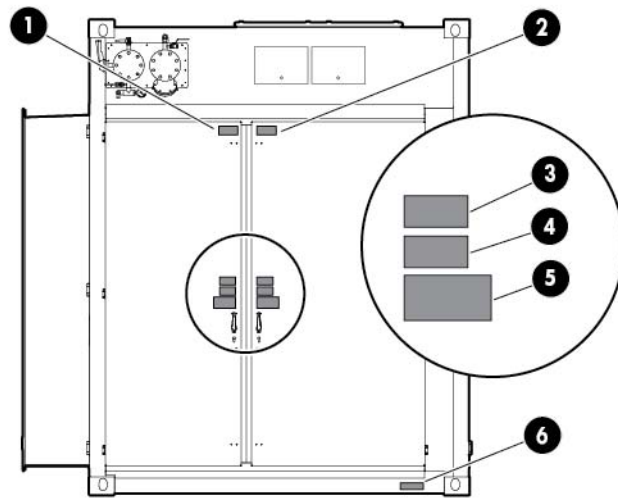
Critical IT and transformer cabinet

Front view shown



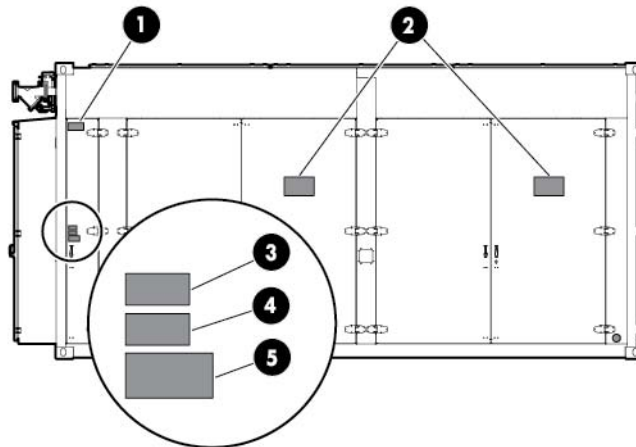
External panel labels

Front view shown



Item	Electrical safety label	Description
1	House panel cabinet high voltage	Provides a reminder to users there are high voltage electrical components inside the cabinet
2	Transformer cabinet high voltage warning	Provides a reminder to users there are high voltage transformers inside the cabinet
3	Disconnect label	Provides the order for disconnecting the electrical panels
4	Short circuit current label	States that the design of the POD can withstand the available fault current and describes the electrical system
5	Arc flash warning	Provides a reminder to users of the danger of arc flash and required PPE
6	Grounding label	Indicates the location of the grounding electrode connection point

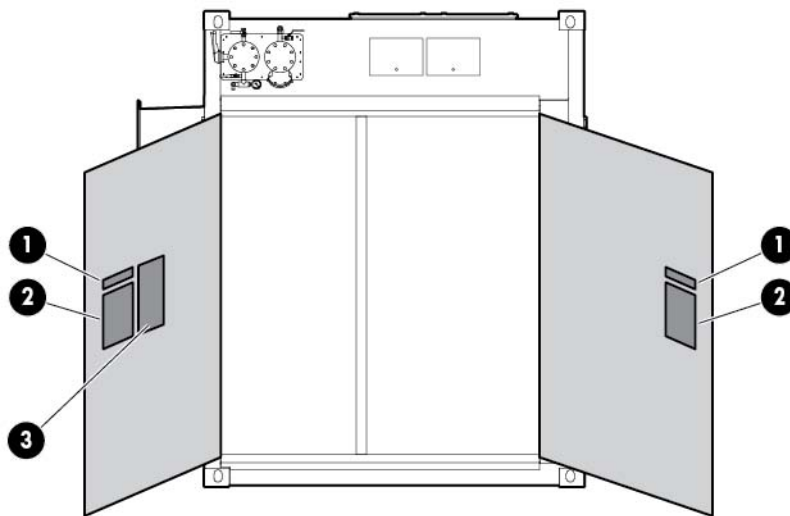
Side view shown



Item	Electrical safety label	Description
1	Main power cabinet high voltage	Provides a reminder to users there are high voltage electrical components inside the cabinet
2	Do not enter label	Provides a warning to users not to enter while a fire is extinguishing
4	Power disconnect label	States that power should be disconnected before maintenance is performed
5	Short circuit current label	States that the design of the POD can withstand the available fault current and describes the electrical system
6	Arc flash warning	Provides a reminder to users of the danger of arc flash and required PPE

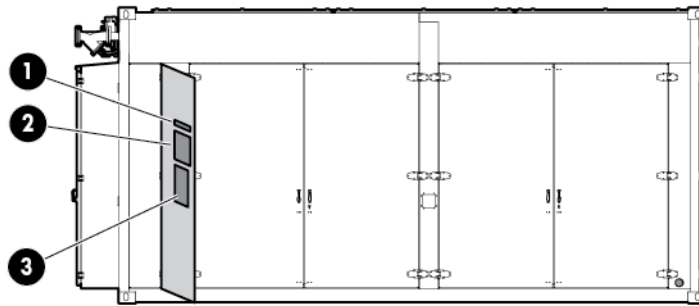
Internal panel labels

Front view shown



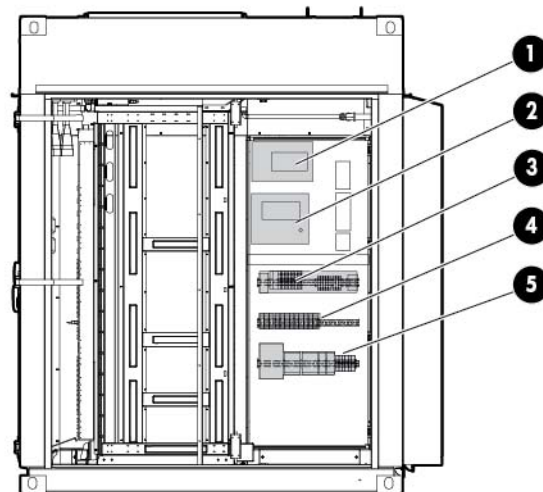
Item	Electrical safety label	Description
1	Power feeders caution label	Cautions users about phase rotation for all power feeders
2	Wire color code	Lists the 380-415 Y/200-240 V color codes: • Brown—Phase A/L1 • Black—Phase B/L2 • Grey—Phase 3/L3 • Blue—Neutral • Green and yellow—Equipment ground
3	Panel schedule/circuit breaker table/fuse list	Lists the layout and designation for all circuit breakers and lists all fuse types and sizes

Side view shown



1	Power feeders caution label	Cautions users about phase rotation for all power feeders
2	Wire color code	Lists the 380-415 Y/200-240 V color codes: • Brown—Phase A/L1 • Black—Phase B/L2 • Grey—Phase 3/L3 • Blue—Neutral • Green and yellow—Equipment ground
3	Panel schedule/circuit breaker table/fuse list	Lists the layout and designation for all circuit breakers and lists all fuse types and sizes

Control cabinet component identification



Item	Component	Description
1	VESDA air sampling smoke detection unit	An early warning, laser scan smoke detection unit
2	Fire alarm and suppression release control panel	- Controls all fire systems within the HP POD 20c, including the smoke detection system, fire suppression system, fire pulls, and so on - Includes a battery backup system that provides backup power to the fire system during a utility power loss
3	ECS relays and ECS modules	Relays for the ECS control, ECS communications, I/O connections, and terminal block connections
4	EPO controller board and house panel fuses	Connections for the EPO system and fuses for other house panel components
5	Dual power supplies with battery backup	Provides 24 V DC power to the PLC, LED lighting, and ECS systems

HP POD 20c racks

The HP POD 20c contains a total of ten IT racks.



CAUTION: If any racks contain empty RU space, use the HP POD 20c filler panels to maintain the efficiency of the HP POD 20c thermal system. Filler panels are available from HP in 10-pack quantities (part number AQ682A) and 100-pack quantities (part number AS993A).

For more information about racks and network cabling, see the *HP Performance Optimized Datacenter Networking Guide*.

Life safety systems

Life safety overview

The HP POD 20c has multiple life safety systems that work together to protect the HP POD 20c equipment and personnel. The following life safety systems are available on the HP POD 20c:

- EPO system (on page 18)
- VESDA air sampling smoke detection system (on page 21)
- (Optional) fire protection system (on page 21)
- Emergency egress (on page 24)
- ECS connection to customer emergency systems

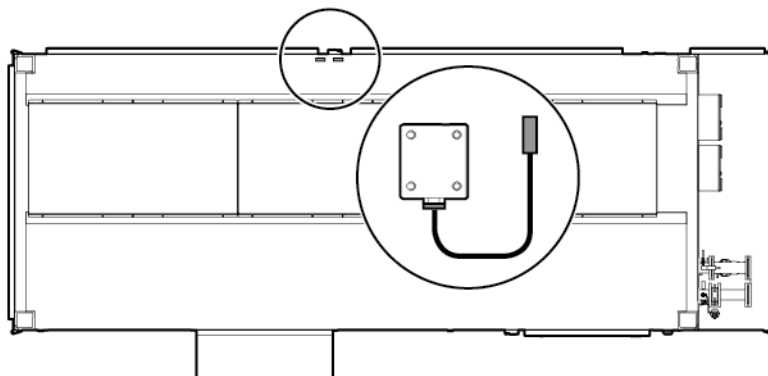
EPO system

If the HP POD 20c must be shut down during an emergency, the EPO system automatically shuts off all power to the HP POD 20c and activates the EPO indicator on the ECS panel door and the EPO strobe on the POD interior.

To ensure that all rack-mounted UPS devices are shut down during an EPO event, verify that each rack-mounted UPS device is connected to the HP POD 20c EPO system.

The EPO system can be activated two ways:

- Excessive high temperature in the hot aisle—The HP POD 20c includes two EPO temperature sensors. If both sensors reach 60°C (140°F), an EPO shutdown is triggered automatically. Both sensors are located in zone 2.



- Manual initiation—To manually trigger an EPO shutdown, press either of the EPO buttons. One EPO button is located on the POD interior near the main exit, and an optional second EPO button is located on the POD exterior.

For the location of EPO buttons, see "Life safety component identification (on page 9)."

The EPO system must be reset before you can power up and restart the HP POD 20c. To reset the EPO system:

1. Verify that the key control for the EPO mode is in the Armed position.
2. Press the white **EPO Reset** button.

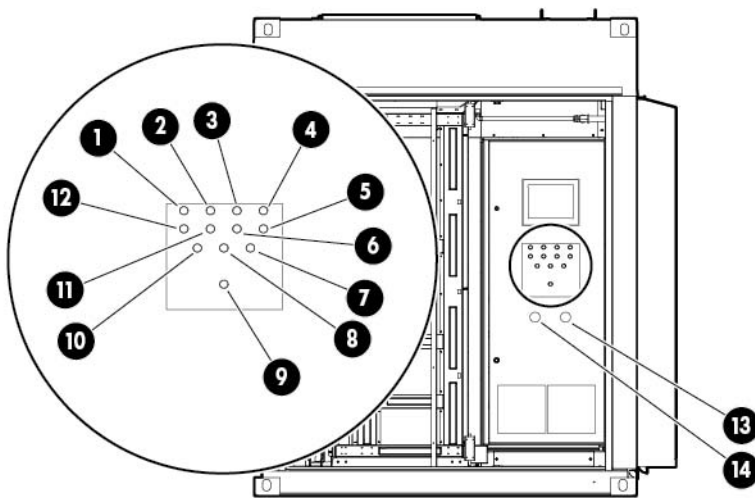
If you triggered the EPO system manually, you must reset the EPO button that you pressed to the Active position.

ECS touchscreen and EPO indicators

The ECS touchscreen and EPO indicators are located on the door to the control panel.

The touchscreen enables you to easily configure the environmental parameters, access data, and monitor environmental, life safety, and access control conditions within the HP POD 20c.

The EPO indicators provide EPO status. The EPO key control and EPO reset button enable you to adjust the EPO system mode.



Item	Component	Indicator Color	Description
1	Source A available indicator	White	Indicates the EPO power status for main power feed A
2	Source A wrong rotation indicator	Red	Indicates the Source A power phase rotation is incorrect
3	Source B wrong rotation indicator	Red	Indicates the Source B power phase rotation is incorrect
4	Source B available indicator	White	Indicates the EPO power status for main power feed B
5	EPO shutdown indicator	Red	Indicates an EPO shutdown or alarm situation
6	EPO armed indicator	White	Indicates that the EPO system is armed and operational
7	EPO reset button	Blue	Resets the EPO system when pressed

Item	Component	Indicator Color	Description
8	EPO mode key control	—	Enables you to select the EPO mode. For more information, see "EPO modes (on page 20)."
9	EPO shutdown button	Red	Initiates a manual EPO event
10	Light test button	—	Tests all the EPO LED indicators when pressed
11	EPO bypass mode indicator	Green	Indicates that the EPO shut down functionality is bypassed
12	EPO test mode indicator	Yellow	Indicates that the EPO system is operating in test mode or that an EPO cover is open
13	Main light switch	—	Turns power to the HP POD 20c lights off and on
14	ECS power switch	—	Turns the main power to the 24V ECS system off and on

EPO modes

The EPO system has three operating modes:

- Armed—The EPO system is armed and operational.
- Test—The EPO system is in test mode and does not initiate during events that normally trigger an EPO.
- Bypass—The EPO system is non-operational and does not initiate during events that normally trigger an EPO.

EPO accidental activation

To help prevent accidentally pressing the EPO button and activating the EPO system, each EPO button is covered with a clear Lexan cover.

Battery backup during an EPO event

The following components are equipped with a UPS to help ensure that service is not interrupted during a loss of power to the HP POD 20c:

- ECS system
- VESDA air sampling smoke detection system (on page 21)
- (Optional) fire suppression system (on page 22)
- Emergency lighting in the HP POD 20c



IMPORTANT: All Critical IT UPS devices with batteries that exceed 700VA must be connected to the HP POD 20c EPO system, to ensure that the UPS batteries are disconnected during an EPO event. For more information on connecting UPS devices to the EPO system, see the *HP Performance Optimized Datacenter 20c Maintenance and Service Guide*.

VESDA air sampling smoke detection system



CAUTION: Excess dust within the HP POD 20c can cause the VESDA smoke detector to trigger a fire alarm.

The VESDA system features a single-zone laser scan, early warning smoke detector to provide the earliest warning of a potential fire.

The red VESDA piping that runs throughout the HP POD 20c includes inlets for smoke sampling. The VESDA uses a high-efficiency aspirator to continuously draw in air from the HP POD 20c and circulate the air through a dual-stage filter:

- Stage 1—A filter removes dust and dirt from the air sample.
- Stage 2—An ultra-fine filter removes remaining contaminants in the air sample.

After the air passes through the dual-stage filter, it enters a calibrated detection chamber where a laser scans the air sample for the presence of smoke. The VESDA system cycles through two levels if smoke is detected:

- Level 1—Smoke concentration reaches the first setpoint, and then the VESDA system sends an alarm signal indicating that a fire might exist.
- Level 2—Smoke concentration reaches the second setpoint, and then the VESDA system indicates that a fire does exist in the HP POD 20c and sends an alarm signal and an activation signal to the fire suppression system.



IMPORTANT: The VESDA filter must be changed regularly to ensure accurate smoke detection readings. For more information about changing the VESDA filters, see the *HP Performance Optimized Datacenter 20c Maintenance and Service Guide*.

(Optional) Fire protection system

Each HP POD 20c is equipped with a fire alarm panel that is integrated with the fire detection system and the optional fire suppression system.

The fire system is designed as a stand-alone system, but can also interface with customer site fire alarm systems. Customer site connections are the responsibility of the customer. Consult with HP for connection locations.

The fire protection system includes:

- Manual fire button (on page [21](#))
- Fire alarm indicators (on page [22](#))
- Fire suppression system (on page [22](#))

Manual fire button

The HP POD 20c includes two fire buttons. One fire button is located next to the personnel access door and the second fire button is located in the fire suppression bump out.

Manually activating a fire button does the following:

- Activates the POD fire alarm system horn and strobe lights

- Triggers a fire alarm signal to the BMS in the fire box (on page 67) and activates a 30-second delay before releasing the fire suppression agent



IMPORTANT: The fire suppression abort button does not delay the release of the fire suppression agent if a manual fire button is initiated. The release of the fire suppression agent is imminent and all personnel should evacuate immediately.

Fire alarm indicators

Upon activation of a fire alarm within the HP POD 20c, the following alarms alert personnel:

- Strobe light—The HP POD 20c includes two fire strobe lights. One is located in the cold aisle and one is located on the POD exterior.
- Audible horn—The HP POD 20c includes two audible horns. One is located in the cold aisle and one is located on the POD exterior.
- Alarm within the ECS—The ECS system notifies you of a fire alarm condition with an alarm alert on the ECS screen.

Fire suppression system



WARNING: Fire suppression agents include a pre-discharge warning and evacuating system. In the event of a fire, all protected space must be evacuated as soon as possible.



CAUTION: The POD fire suppression system is manufacturer designed, engineered, and installed to comply with national standards. However, HP does not certify that the installed fire suppression system meets all local jurisdictional requirements. Compliance with local codes is your responsibility, and includes specific local requirements for initial and periodic inspections, certifications, and maintenance.

Any additional local requirements are not covered as part of the option price or basic installation and deployment services, unless specifically included in an executed Statement of Work.



IMPORTANT: The fire suppression abort buttons that are located on the ECS panel and next to the fire suppression cylinders can be pressed to interrupt the 60-second fire suppression agent release delay of the VESDA system. Pressing either of these buttons resets the fire suppression agent release delay to 10 seconds. Pressing and holding either of the fire suppression abort buttons stops the agent release. Releasing the fire suppression abort button that is being held gives personnel 10 seconds to evacuate before agent release. The fire suppression abort buttons do not operate if a manual fire button is activated.

The fire suppression system contains conventional fire alarm control circuits and includes features required for single or dual-hazard suppression release applications, including a low-toxicity agent. In the event of fire suppression release, the suppression tanks must be refilled by a certified technician.

Fire system operator panel

The panel is configured by the manufacturer in accordance with the local fire marshal and fire code requirements.

The operator panel includes the following:

- Alarm status LED

- Trouble status LED
- Input status LED
- Output status LED
- Acknowledge button
- Alarm Silence button
- System Reset button

The fire system and panel are tested by the local certified fire system supplier and witnessed and certified by the local Authorities or fire marshal.

The fire system operator panel requires regular maintenance and service. For more information on the fire system operator panel component, see the *Operation and Maintenance Manual for the HP Performance Optimized Datacenter 20c*.

Fire suppression sequence of operations

There are two initiation sequences for the fire suppression system, automatic (VESDA) initiation and manual initiation. The fire strobe light is activated by either initiation sequence.

Personnel can determine the status of the system by the differences of the alarm horn. The following table describes the fire suppression system status.

Fire suppression system stages	Beats per minute	Description	Personnel actions
Warning	20	An alarm condition exists	Personnel may investigate
Pre-discharge	120	Countdown to fire suppression agent has started	Personnel should evacuate
Post-discharge	Steady	Fire suppression agent is released	Personnel should not enter, contact local Authorities

The fire system operator panel indicates which initiation sequence has begun with indicator lights and a panel alarm. These signals are also available to the site BMS system, if connected.

After the fire suppression system is activated by a VESDA signal or a manual fire button, a 60-second countdown begins before the fire suppression agent is released to the HP POD 20c interior through the fire suppression system piping.

VESDA initiation

The VESDA fire suppression system signal has two levels that the system cycles through when smoke is detected.

- Level 1—Indicates that the potential for a fire is present. The strobes are illuminated and the horns are in the Warning stage. A fire has not yet been detected and personnel may investigate to determine if there is a potential for a fire or if a false indication has occurred.
- Level 2—Indicates that fire does exist. VESDA Level 1 has already have been reached, the strobes illuminate, and the horn progresses to the Pre-discharge stage. A 60-second countdown to fire suppression agent release begins and personnel should evacuate immediately.

Press the fire suppression abort button to interrupt the fire suppression release countdown. Pressing the abort button resets the countdown to 10 seconds, regardless of the amount of time elapsed from the original 60-second countdown. The abort button can be pressed multiple times to reset the fire suppression release

agent countdown to 10 seconds. The fire suppression agent is released when the countdown is exhausted and the horn progresses to the Post-discharge stage.

Personnel can press and hold the fire suppression abort button to stop the original 60-second initiation sequence. When the abort button is released, the system countdown resets to 10 seconds. The fire suppression agent release begins when the 10-second countdown is over and the horn progresses to the Post-discharge stage.

Manual initiation

Manual initiation causes the fire strobe lights to illuminate, the horn goes to the Pre-discharge stage, and a 30-second countdown until the fire suppression agent release begins. The agent release is certain at this time and cannot be aborted. After the fire suppression agent is released, the system goes to the Post-discharge stage.

The fire suppression abort button is inactive if a manual fire pull was activated and the release of the fire suppression agent is imminent. All personnel should immediately evacuate.

Emergency egress

The HP POD 20c includes the following features for life safety egress on all access doors:

- Panic bar
- Door strikes
 - Standard hardware—Door strikes
 - Optional hardware—Electric door strikes

Each personnel door includes a standard panic bar to ensure safe exit. The optional egress hardware included in the HP POD 20c (including electric panic bars, electric strikes, and magnetic locks) are tied to the fire alarm to enable uninhibited egress in the event of an emergency.

Power, electrical, and controls

Site electrical system

To ensure a complete and safe integration of the HP POD solution with your facility, HP requires that you complete the following actions for the installed electrical system prior to the installation of the HP POD solution:

- Short circuit analysis
- Arc flash study
- Circuit breaker coordination study

These actions must be performed for all associated parts of the electrical power train. The majority of the details and factors required to complete these studies are associated with the existing installed facility infrastructure.



CAUTION: Failure to complete these studies can cause serious issues with the electrical integration of the POD into your electrical system.

Power safety



WARNING: To avoid the risk of personal injury or loss of life, all personnel must comply with PPE requirements when opening or working inside areas of the HP POD 20c that are marked as hazardous voltage, in accordance with NFPA 70 (NA) and IEC (EMEA and APJ).

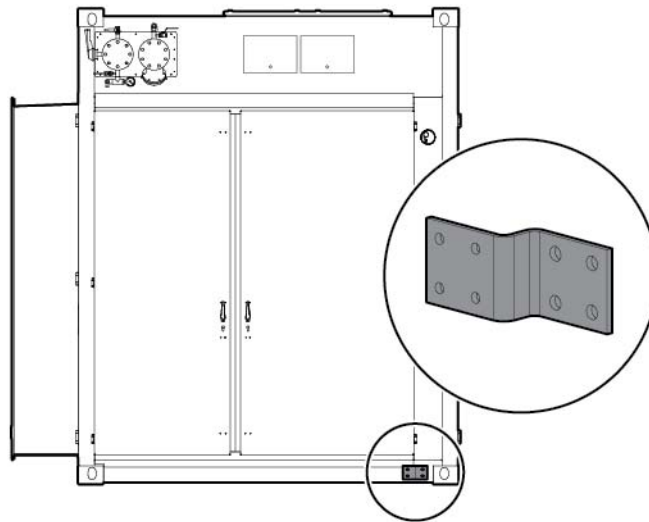
Grounding



WARNING: To avoid the risk of personal injury or electric shock, the HP POD 20c must be properly earthed (grounded) in accordance with NFPA 70 (NA) and IEC (EMEA and APJ).

The HP POD 20c must be properly earthed to ensure a common return path for electric current, limit the build-up of static electricity, and absorb an unlimited amount of current without changing its potential. To properly ground the HP POD 20c to the earth, you must connect the POD to building steel, a ground rod, or a properly installed ground well that is connected to a building's grounding system. The grounding electrode conductor connection point is located on the cold aisle side adjacent to the power cabinet.

A certified electrician must test and verify that the HP POD 20c is properly grounded.



Lightning protection

The HP POD 20c structural and internal components are bonded together. A common Grounding Electrode Conductor Connection point is provided. Proper bonding and grounding of the HP POD 20c minimizes the effects of a lightning strike. A surge protection device is provided on the HP POD 20c input connection to protect the HP POD 20c electrical system from voltage transients. If your site is in an area that is subject to frequent lightning strikes, the HP POD 20c must be protected in accordance with the applicable IEC regulations. HP recommends that you contact a certified lightning protection consultant.

Capacities

HP POD 20c capacity limitations

The capacity limitations for the HP POD 20c are separated into two categories: electrical power and mechanical cooling capacities. Both of these categories are interdependent and must be considered in conjunction with the overall customer requirements.

Electrical and mechanical cooling capacities

Feature	Specification
Critical IT electrical connections	2 x 320 A feeders at 380-415 VAC WYE, 3-Phase, 4-wire, with equipment grounding conductors 5.1 x 10.2 cm (2 x 4 in) conduit fittings per feeder provided
Critical IT power capacity	• Non-redundant—263-288 kW • 2N Redundant—132-144 kW
Mechanical cooling electrical connections	Not applicable Power for the cooling system fans comes from the critical IT power feeds.
Mechanical cooling capacity	• Non-redundant—300 kW • N+1 Redundant—250 kW

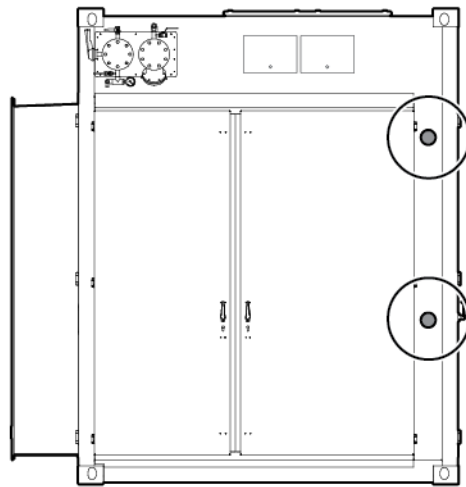
Power feeders



IMPORTANT: A licensed electrician must connect the power according to all local and national electrical codes, and must comply with manufacturer specifications.

The HP POD 20c has two power feeder couplings that provide the entrance for power to the POD. The power feeders route into the top of each electrical panel on the end of the HP POD 20c.

Front view shown



Power feeders are sized in accordance with IEC regulations. Maintain IP44 protection levels when installing power.

Electrical panels



WARNING: To avoid the risk of personal injury or loss of life, all personnel must comply with PPE requirements when opening or working inside areas of the HP POD 20c that are marked as hazardous voltage, in accordance with IEC.



WARNING: To avoid the risk of personal injury or loss of life, all personnel must comply with electrical warning labels when operating and maintaining the electrical panels and systems of the HP POD 20c.

For the external electrical power component locations, see "Electrical power component identification (on page 12)."

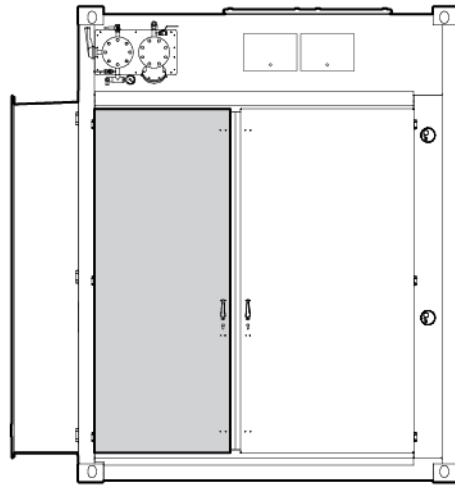
Arc flash safety

The customer must complete an arc flash assessment of the HP POD 20c and the associated electrical supply system for operation, maintenance, and so on.

Power distribution: electrical busway system

The rack power distribution system for the HP POD 20c is protected by electrical circuit breakers located on the end of the HP POD 20c.

Front view shown



Feature	Specification
Number of busways	2
Frequency	50-60 Hz
Amps (per busway)	200 A
Voltage (per busway)	380-415 V
Grounding	Copper
Busway conductors	3-phase + neutral + equipment ground

Panel schedules

The panel schedule for each electrical panel is permanently affixed to the inside cabinet door of each electrical panel.

Wire color code



IMPORTANT: The use of UL-approved colored tape over another color of wire is only acceptable on wire sizes #2 and larger.

220-240 V wiring system—Power required for the transformer in control cabinets and convenience outlet

Wire color	Description
Brown	Single-phase current carrying conductor
White	Blue
Green and yellow	• Equipment grounding conductor • Bonding conductor • Earth ground

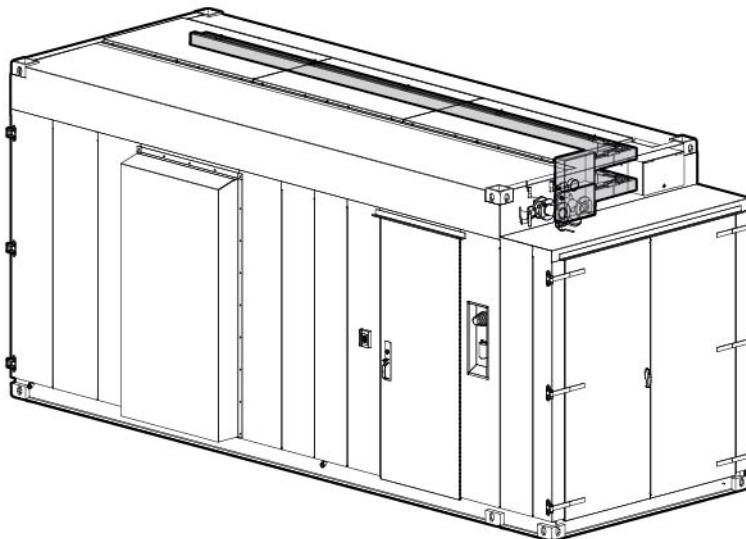
380-415 V wiring system—Critical IT power feeds and main power feeds

Wire color	Label	Description
Brown	L1	A Phase
Black	L2	B Phase
Grey	L3	C Phase
Blue	N	Neutral
Green and yellow	PE	• Equipment grounding conductor • Bonding conductor • Earth ground

Electrical busways

The electrical busway is a modular, overhead electrical distribution system that supplies power to the HP POD 20c IT loads. The HP POD 20c has a total of two busways, and each bus can support 200 A.

Top view shown

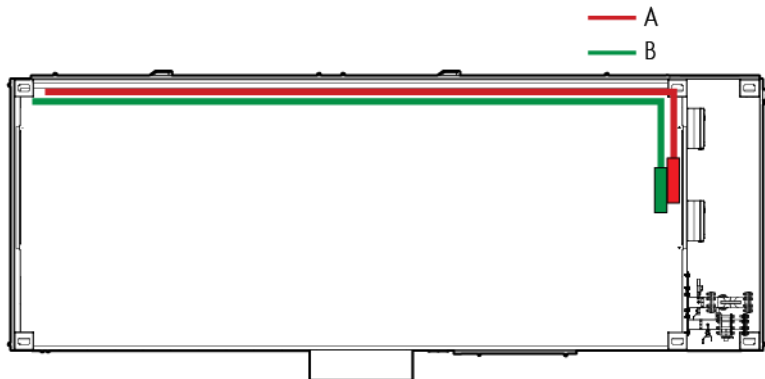


The HP POD 20c electrical busways can be configured for non-redundant power or redundant power. The HP POD 20c can be installed as a single source 1N load by providing all required feeders from one common power source and from common switchboards and transformers. A 2N redundancy installation is configured by feeding the parallel power paths from independent power sources, switchboards, and transformers.

- **Non-redundant power installation (1N load)**—Both busways are powered from the same power feed.



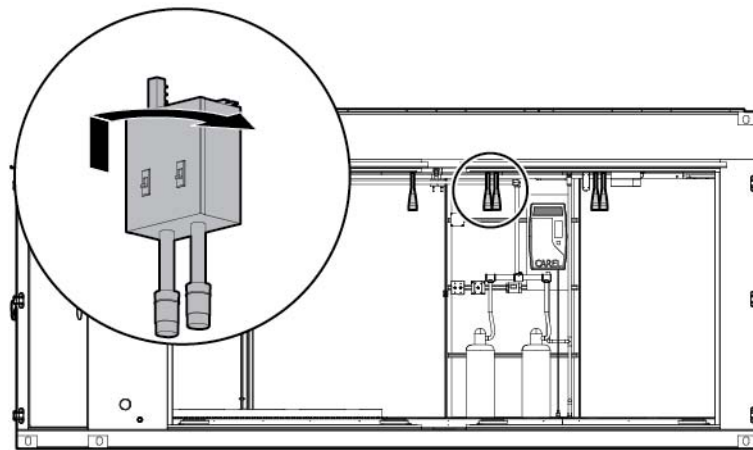
- **Redundant power installation (2N load)**—Each busway is powered from parallel power paths from independent power feeds.



Drop boxes

The internal electrical busways provide a location to connect each of the drop boxes, which then power the PDUs. Stagger the drop boxes on the electrical busways by connecting one drop box to busway #1 and connecting the next drop box to busway #2. A staggered configuration enables load balancing with the rack equipment and is necessary to ensure redundancy.

Side view shown



Disabling power

- To disable power to a single PDU, open the drop box breaker that powers the PDU, and then disconnect the PDU from the drop box.
- To disable power to a single rack, open the drop box breakers that power each of the PDUs installed in that rack.
- To disable power to a single busway, open the appropriate breaker for that busway on the corresponding electrical busway panel on the HP POD 20c exterior.
- To disable power to all racks, open the breaker for each busway on the corresponding electrical panel on the HP POD 20c exterior.

Power configurations



IMPORTANT: Different PDUs can alter the average power capacity per rack.

Configuration	Number of 3-phase PDUs per HP POD 20c	Number of drop boxes per HP POD 20c	Average power capacity per rack	Total HP POD 20c power capacity
Non-redundant	20	10	28.8	288 kW*
Redundant	20	10	14.4	144 kW*

*The HP POD 20c is electrically limited to $N = 288 \text{ kW}$ / $2N = 144 \text{ kW}$.

Rack power

Power is provided to each rack by PDUs and drop boxes. The PDUs are powered by the drop boxes attached to each electrical busway. For more information about electrical busway drop boxes, see the *HP Performance Optimized Datacenter 20c Maintenance and Service Guide*.

Feature	Specification
Rack type	HP POD rack
Max number of racks	10
Max U space per rack	50U
Max U space per HP POD 20c	500U
Server capacity	288 kW power capacity
Average capacity per rack	28.8 kW
Peak capacity per rack	69 kW
Voltage to rack	200-240 VAC
Rack configuration	Redundant/Non-redundant capabilities
Total number of PDU's	20 (two per rack)
Max power per PDU	30 A = 17 kW; 60 A = 34 kW
Max load (Chilled POD cooling mode)*	288 kW
Airflow per rack (Chiller POD cooling mode)	1,700 CFM

*Dependent on configuration

HP POD 20c lighting

The HP POD 20c includes six LED lights. Three lights are located in the cold aisle and three lights are located in the hot aisle.

The main light switch is located on the ECS control panel door. For more information on the light switch location, see "Life safety component identification (on page 9)."

Two of the six lights are connected to battery backup power, keeping the interior of the HP POD 20c illuminated during a power outage or emergency.

For more information on lighting, see the *HP Performance Optimized Datacenter 20c Maintenance and Service Guide*.

Environmental control system

Environmental control system overview

The ECS developed for the HP water-cooled POD is a stand-alone control system that requires no external connections with an external site system, BMS, public or private Internet sites, cloud, or wireless system to properly control the POD operation.

The ECS includes Modbus TCP/IP connections through which a variety of data can be retrieved. These capabilities enable you to connect, at your expense, with the stand-alone ECS system to monitor the operating parameters of the POD. It is your responsibility (or your representative's or agent's responsibility) to integrate this communication capability into any existing BMS or monitoring system.



CAUTION: To ensure that alarm conditions can be identified and resolved, HP recommends that you remotely monitor all alarm conditions. Failure to monitor the alarm conditions can cause delays in appropriate action during an alarm condition.

Using the ECS

HP recommends connecting the HP POD 20c to your facility BMS and establishing communication through the Ethernet cable connected to the external communications box. For more information, see "Configuring the ECS (on page 39)."

The HP POD 20c ECS is a Windows-based system with the following features:

- Intel Core Duo processor
- 15-inch touchscreen
- 512 MB RAM
- 80 GB hard drive
- 24 V DC power supply
- One serial port
- Four USB ports
- 1x10/100 BASE-T and 1x10/100/1000 BASE-T Ethernet connectors

The standard ECS protocol, Modbus TCP/IP, is a data communication protocol for building automation and control networks. Connecting across different protocols might require additional engineering labor and coordination between your in-house control manufacturer and HP. It is your responsibility to make the connection between the HP POD 20c and a BMS system.

The ECS provides the following:

- A supported communication interface that can monitor and control certain HP POD 20c components remotely
- Immediate notification of all supported alarm messages

By connecting your HP POD 20c to a BMS system, you can monitor the various parameters and alarms. For more information, see "Navigating the ECS interface (on page 43)." The complete list of parameters and alarms that can be monitored will be discussed with your facilities personnel.



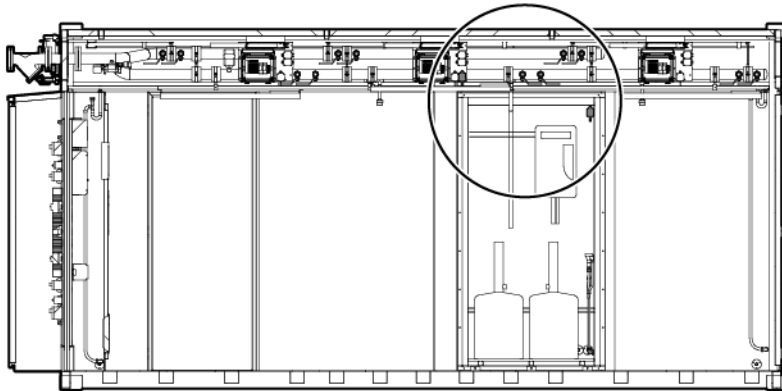
IMPORTANT: If your site does not have a BMS, HP POD 20c ECS data can be sent to and viewed from a set IP address. Communication occurs through an Ethernet cable that is connected to the demarcation box (on page 66).

Sensors

The HP POD 20c has several temperature sensors that monitor the environmental factors and communicate data back to the ECS.

Humidity sensors

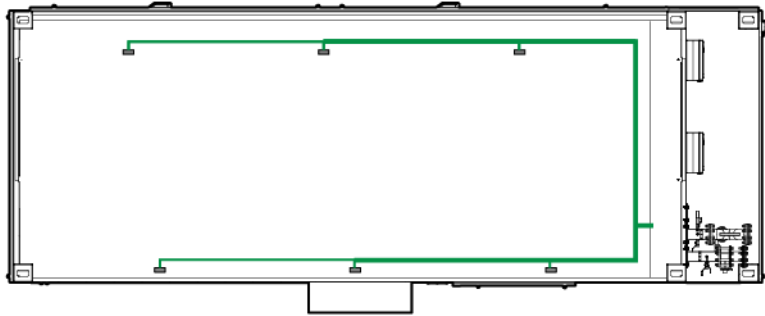
Two humidity sensors monitor humidity in the cold aisle and report data to the ECS.



Pressure sensors

Six Beckhoff pressure sensors located in the control cabinet measure the differential pressure between the hot aisle and the cold aisle, as well as the air filters. These pressure sensors monitor the pressure at nine sampling locations throughout the HP POD 20c and report output data to the ECS. The ECS uses the calculated aisle differential pressures to control fan speed and uses the zone filter differential pressure to indicate when filters need to be replaced.

Top view shown



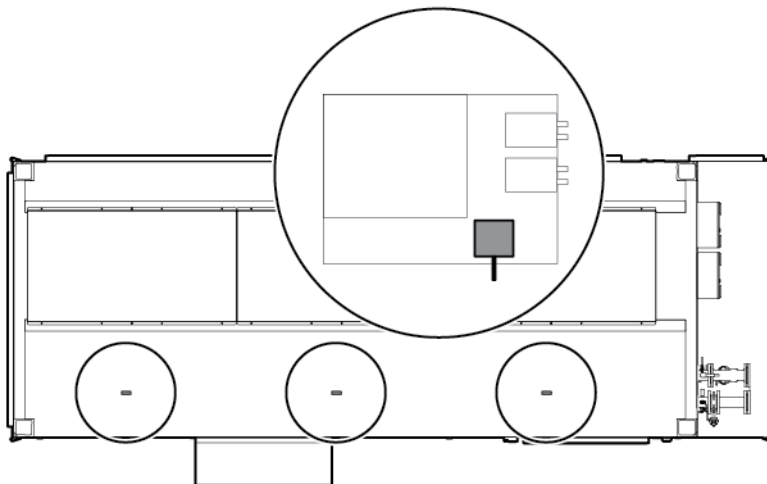
Temperature sensors

The values from the temperature sensors are averaged, and this value determines the appropriate temperature for each aisle of the HP POD 20c.

Cold aisle temperature sensors

Three temperature sensor probes are located in the cold aisle of the HP POD 20c. These temperature sensors monitor the temperature in various locations throughout the cold aisle and report data to the ECS.

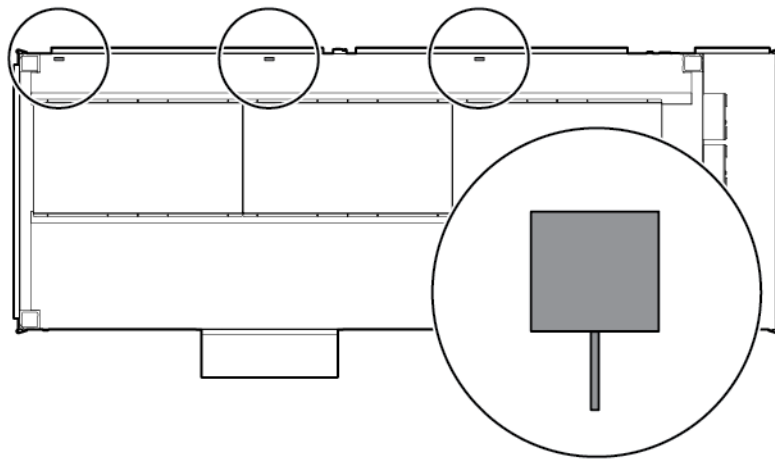
Top view shown



Hot aisle temperature sensors

Three temperature sensor probes are located in the hot aisle of the HP POD 20c. These temperature sensors monitor the temperature in various locations throughout the hot aisle and report data to the ECS.

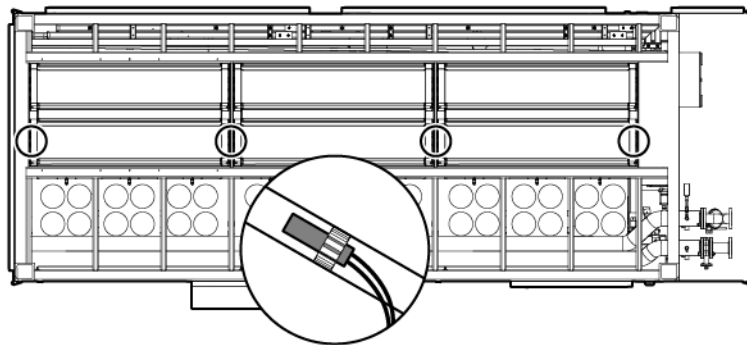
Top view shown



Heat exchanger temperature sensors

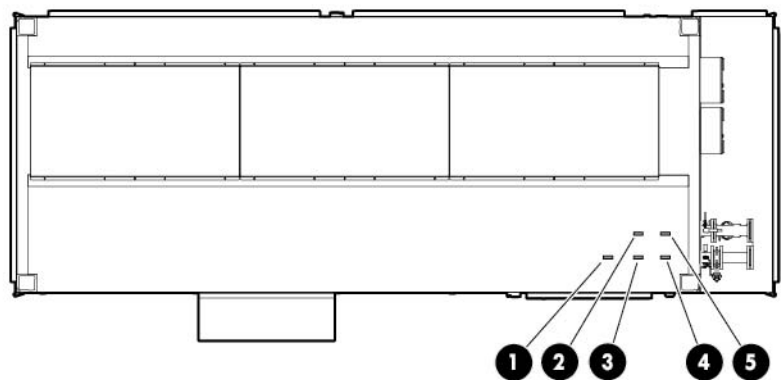
There are two contact temperature sensors per heat exchanger. One temperature sensor is located on the inlet supply piping and one temperature sensor is located on the outlet return piping. These sensors measure water temperature and report data to the ECS.

Top view shown



Facility chilled water sensors

Five sensors are located on the facility chilled water supply and return pipes. These sensors report data to the ECS.



Item	Component	Description
1	Return water flow sensor	Detects the water flow rate for the chilled water return
2	Supply water pressure sensor	Detects the water pressure for the chilled water supply
3	Return water pressure sensor	Detects the water pressure for the chilled water return
4	Supply water temperature sensor	Detects the water temperature for the chilled water supply
5	Return water temperature sensor	Detects the water temperature for the chilled water return

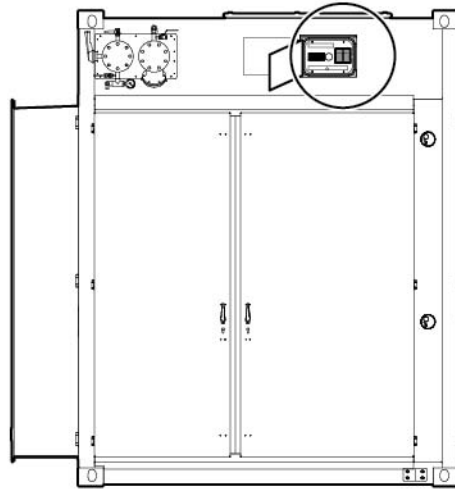
Facility connections to ECS

You can connect your facility to the ECS using the RJ45 in the demarcation box (on page 66) or cables that are hard-wired through the connection portals on the cargo end of the HP POD 20c. The system uses Modbus TCP/IP for communication.

Connecting to the ECS

To connect the network to the ECS control panel, route an Ethernet cable to the appropriate RJ45 connector inside the HP POD 20c demarcation box (on page 66).

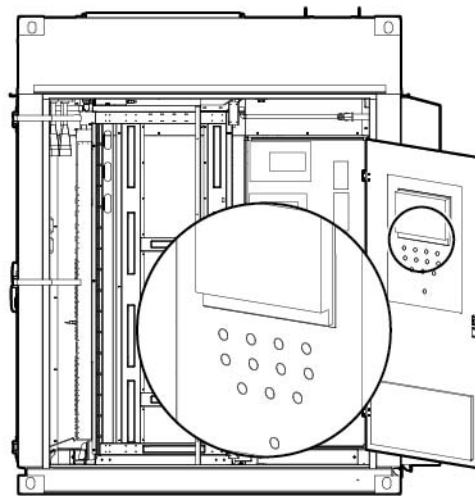
Front view shown



Managing the ECS from the HP POD 20c

The ECS interface is viewed directly from the ECS screen on the control cabinet door in the cold aisle. For more information, see "ECS touchscreen and EPO indicators (on page 19)."

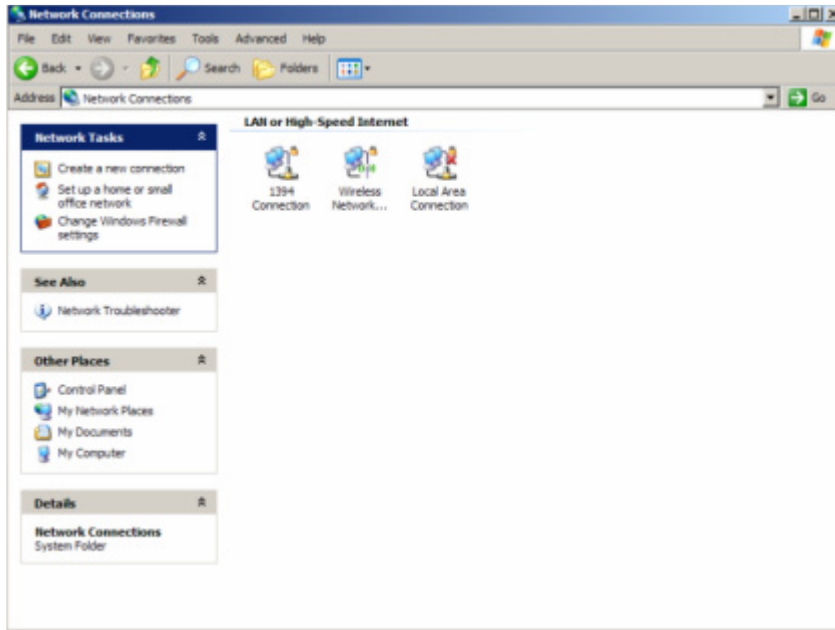
To access the ECS using a host computer, connect an Ethernet cable between the host computer and the designated ECS jack on the back of the door inside of the control cabinet.



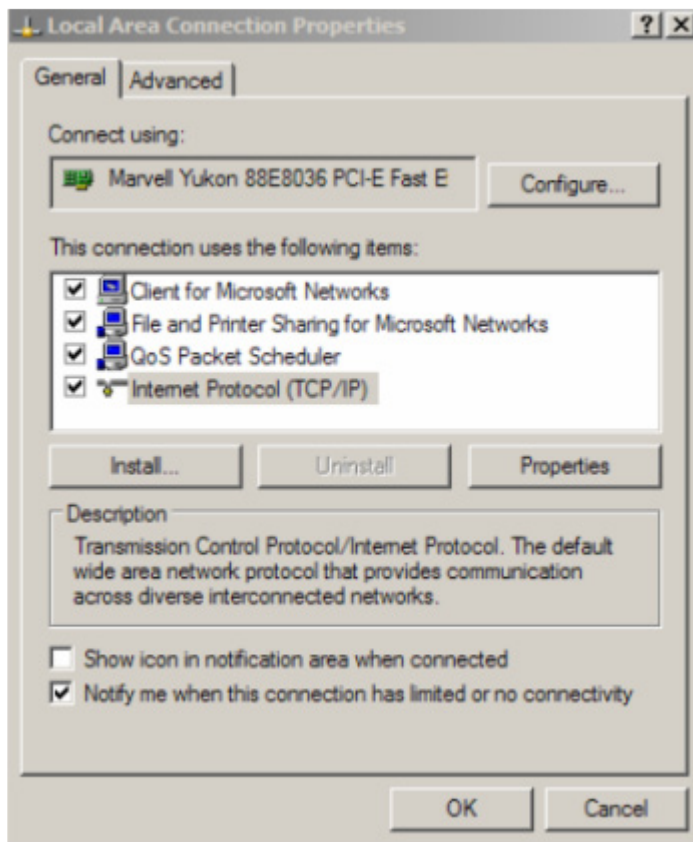
Configuring the ECS

1. Connect a host computer to the ECS. For more information, see "Managing the ECS from the HP POD 20c (on page 39)."
2. Configure your computer network groups:

- a. Select **Start>Control Panel>Network Connections**.

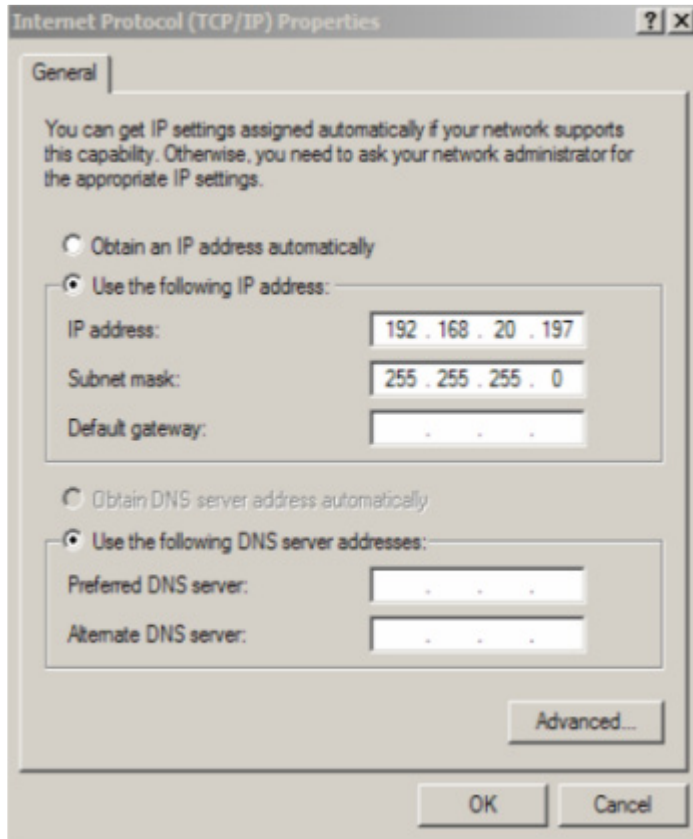


- b. Double-click **Local Area Connection**.
c. Select **Internet Protocol (TCP/IP)**.
d. Click **Properties**.



- e. Select **Use the following IP address**.

- f. Enter the new IP address. Be sure to specify an IP address in the same network group as the ECS controller. By default, the ECS controller uses 192.168.20.1. The IP address for your computer can include any number in the group from 2 to 254.
- g. Click **OK**.



3. Click **OK** to save changes and close the TCP/IP Properties screen.
4. Click **OK** to close the Local Area Connections Properties screen.

Logging in remotely to the ECS

Before you can log in remotely, you must do the following:

- Add the PLC to a network.
- Obtain a username and password.
- Obtain the static IP address of the PLC. For more information, see "Locating the ECS IP addresses (on page 42)."

Use the remote desktop application to log in to the ECS remotely:

1. On the remote computer, select **Start> All Programs> TightVNC> TightVNC Viewer**.
The TightVNC window appears.

2. In the TightVNC Server field, enter the IP address for the PLC.



3. Click **Connect**.
4. In the User name field, enter the user name.



IMPORTANT: When logging in to the Remote Desktop, the default user name is Administrator and the default password is HPINVENT.

5. Click **OK**.

Locating the ECS IP addresses



IMPORTANT: The ECS has three NIC addresses: 10.10.10.1, 10.10.10.2, and an IP address that is set up by the customer for external communication.

The PLC must be connected to locate the IP address for each NIC. For more information, see "Managing the ECS from the HP POD 20c (on page 39)."

To locate the ECS IP address:

1. Select **Start>Run**.
2. Enter `ipconfig`.

The IP address appears.

-or-

1. Select **Start>Network and Sharing Center**.
2. Right-click Local Area Network.
3. Click the **Support** tab.

The IP address appears.

Password protection

The ECS has two levels of access control:

- Customer
- Service

The following screens are available using the customer-level password:

- Overview screen ("[Status Overview screen](#)" on page 47)
- Status Overview screen (on page 47)
- Basic System Configuration screen (on page 47)



CAUTION: Making changes to the ECS in the service-level area can cause the cooling system components to fail. Only allow authorized, qualified, and trained personnel to change configuration settings in the service-level area of the ECS.

The following screens require the service-level password:

- Advanced System Configuration screen (on page 52)
- Controller Settings screen (on page 55)

Navigating the ECS interface

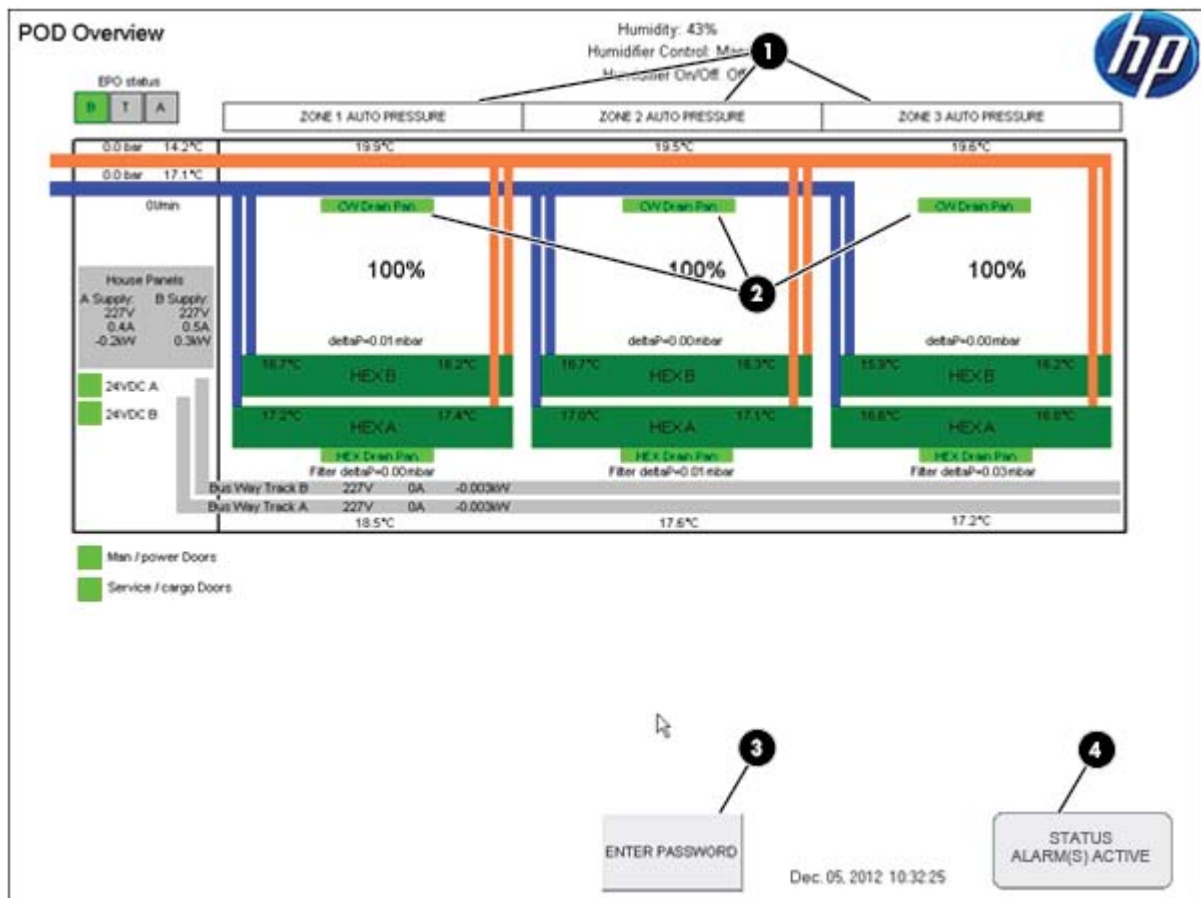
The ECS interface provides information for several environmental and access control conditions that can be monitored and configured from the ECS touchscreen.

To navigate to specific screens from the Overview screen ("[Status Overview screen](#)" on page 47), select the button for the appropriate screen.



CAUTION: Making changes to the ECS in the service-level area can cause the cooling system components to fail. Only allow authorized, qualified, and trained personnel to change configuration settings in the service-level area of the ECS.

IMPORTANT: Depending on the ECS configuration, the ECS numbers and screens might vary.



Item	Button	Description
1	Zone (#) power supply status	Navigates directly to the Power Details screen for the specified Zone (#)
2	Fan Bank Output	Navigates directly to the Fan Control Detail screen for the specified Zone (#)
3	Enter Password	- Enter customer level password—Navigates directly to the Basic System Configuration screen (on page 47) - Enter service level password—Navigates directly to the Advanced System Configuration screen (on page 52) or the Controller Settings screen (on page 55)
4	System status/reset Alarms	Resets existing alarm conditions and navigates directly to the System Status screen

Logging in to the ECS touchscreen

To log in to the ECS touchscreen:

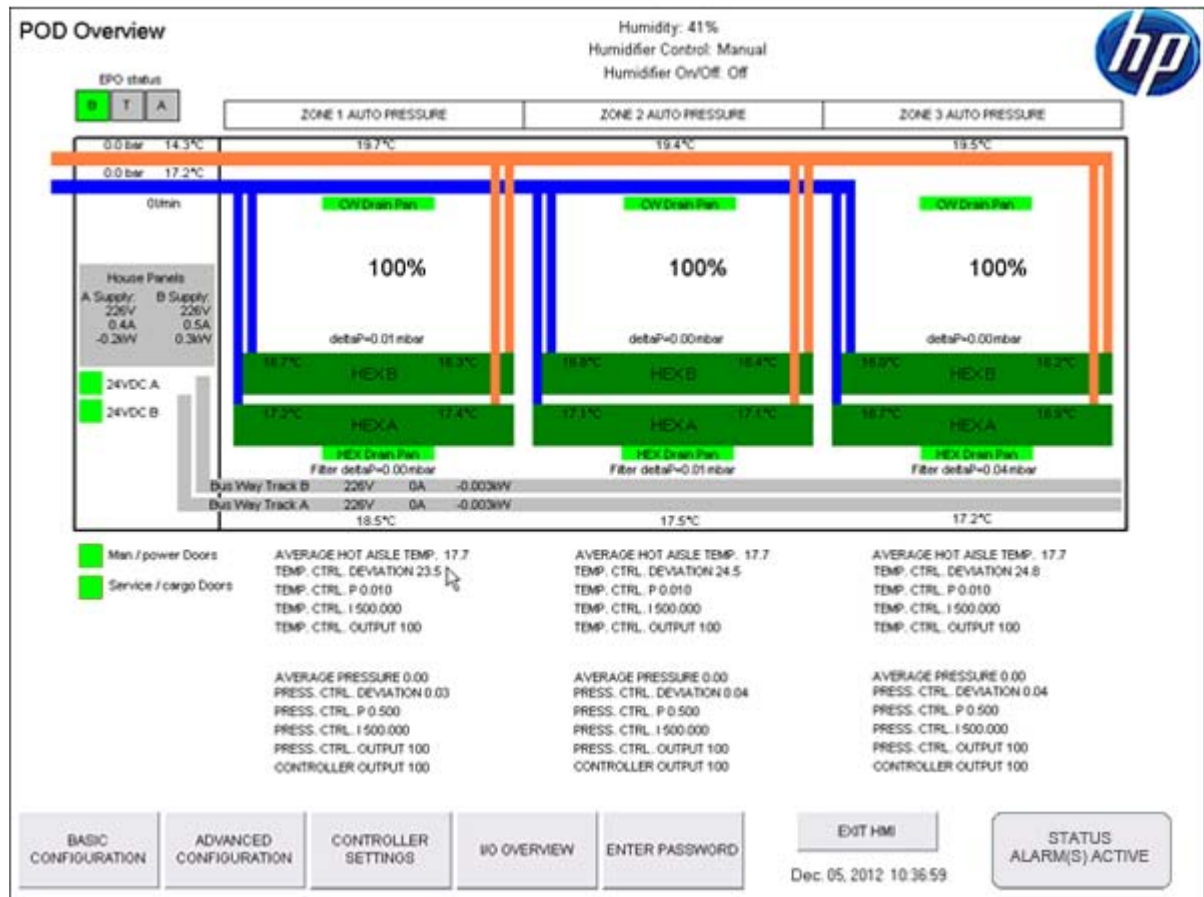
1. From the Overview screen, click **Enter Password**.

A keypad appears.

2. Enter your ECS password.
3. Click **OK**.

Overview screen

The Overview screen appears upon activation of and displays an overview of the ECS components and the status of each component.



The Overview screen displays the following information.

Information	Description
EPO system status	Indicates the status of the EPO system: • B—The EPO system is non-operational and does not initiate during events that normally trigger an EPO. • T—The EPO system is in test mode and does not initiate during events that normally trigger an EPO. • A—The EPO system is armed and operational.
Average voltage, current, and power drawn on the A and B busways	Indicates electrical usage
Relative humidity	Indicates the relative humidity percentages from each of the humidity sensors

Information	Description
Fan speed	Indicates the fan bank speed percentage
Hot aisle temperature	Indicates the average temperature in the hot aisle
System status	Indicates the status of the ECS system: • Green—All components within the ECS system are operating within normal parameters, and there are no active ECS alarms. • Red—One or more of the ECS components is indicating an alarm condition.
Manual mode indicators for fans and dampers	Indicates if the fans and dampers are running in manual mode
Door access indicators	Indicates whether an access door is open or closed
Average cooling system performance data	Indicates cooling system sensor averages
Differential pressure values	Indicates the differential pressure values from each of the differential pressure zones between the hot aisle and the cold aisle

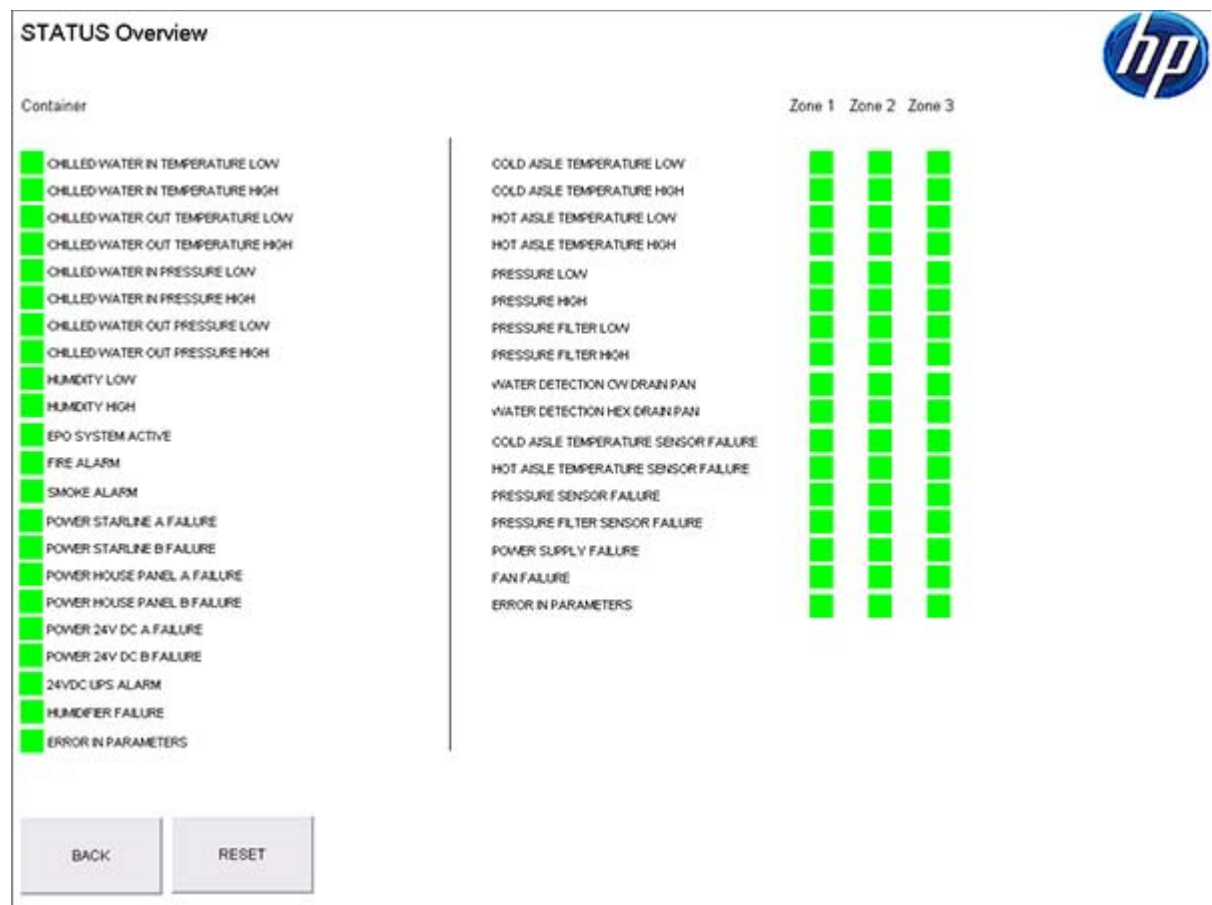
The ECS component icon colors indicate the component status:

- Green—No alarm conditions exist and the component is operating within normal parameters.
- Red—An alarm condition for that component exists.
- Bold numbering on a yellow background—An instrument reading is outside of the alarm limits.

For more information about alarm conditions, see "ECS alarms (on page [57](#))."

Status Overview screen

The Status Overview screen displays the status of all system component alarms. For more information about the alarms, see "ECS alarms (on page 57)."



The ECS component icon colors indicate the component status:

- Green—No alarm conditions exist and the component is operating within normal parameters.
- Red—An alarm condition for that component exists or the component failed.

Basic System Configuration screen



IMPORTANT: The ECS parameters must only be set by qualified service personnel.

The Basic System Configuration screen displays the basic alarm parameters, humidifier control, and fan controls. The configured parameters are only used to trigger an ECS alarm. The parameters listed on this screen do not configure the cooling system.

Basic System Configuration 1775s active

LOGOUT



Container Configuration

Chilled Water Supply Low Alarm Temperature	10.0°C
Chilled Water Supply High Alarm Temperature	25.0°C
Chilled Water Return Low Alarm Temperature	10.0°C
Chilled Water Return High Alarm Temperature	30.0°C
Chilled Water Supply Pressure Low Alarm	0.5 bar
Chilled Water Supply Pressure High Alarm	5.0 bar
Chilled Water Return Pressure Low Alarm	0.5 bar
Chilled Water Return Pressure High Alarm	5.0 bar
Humidity Low Alarm	15.0 %
Humidity High Alarm	85.0 %

Humidifier Control

Humidifier Control	Manual
Humidifier Status	Off
Humidifier Setpoint (%)	0

BACK

Zone Configuration

	Zone 1	Zone 2	Zone 3
Cold Aisle Low Alarm Temperature	0.0°C	0.0°C	0.0°C
Cold Aisle High Alarm Temperature	30.0°C	30.0°C	30.0°C
Hot Aisle Low Alarm Temperature	1.0°C	1.0°C	1.0°C
Hot Aisle High Alarm Temperature	55.0°C	55.0°C	55.0°C
Difference Pressure Low Alarm	-2.0 mbar	-2.0 mbar	-2.0 mbar
Difference Pressure High Alarm	10.0 mbar	10.0 mbar	10.0 mbar
Difference Pressure Filter Low Alarm	0.0 mbar	0.0 mbar	0.0 mbar
Difference Pressure Filter High Alarm	10.0 mbar	10.0 mbar	10.0 mbar

Fan Control

	Zone 1	Zone 2	Zone 3
Fan Control (automatic/manual)	Auto	Auto	Auto
Fan Control	Pressure	Pressure	Pressure
Fan Status (output in %)	100 %	100 %	100 %

Panel Software: POD-S-C
Version: version 1.0.11

You can select and configure the following parameters:

- Cold aisle temperature alarm
- Hot aisle temperature alarm
- Humidity alarm
- Differential pressure alarm
- Differential pressure filter alarm
- Chilled water supply pressure
- Chilled water supply temperature
- Chilled water return temperature
- Chilled water return pressure

You must select **Save** to store the parameter changes in the system configuration file. If you do not save your changes, the old parameters stored in the configuration file reload when the system starts.

Configuring the chilled water supply temperature alarm parameters

The current temperature parameters appear on the related buttons.

To configure the chilled water supply low temperature alarm parameters:

1. Select **Chilled Water Supply Low Alarm Temperature**.
A keypad appears.
2. Enter a temperature alarm parameter.
3. Select **Save** to store the new parameters in the system configuration file.

To configure the chilled water supply high temperature alarm parameters:

1. Select **Chilled Water Supply High Alarm Temperature**.
A keypad appears.
2. Enter a temperature alarm parameter.
3. Select **Save** to store the new parameters in the system configuration file.

Configuring the chilled water return temperature alarm parameters

The current temperature parameters appear on the related buttons.

To configure the chilled water return low temperature alarm parameters:

1. Select the **Chilled Water Return Low Alarm Temperature**.
A keypad appears.
2. Enter a temperature alarm parameter.
3. Select **Save** to store the new parameters in the system configuration file.

To configure the chilled water return high temperature alarm parameters:

1. Select the **Chilled Water Return High Alarm Temperature**.
A keypad appears.
2. Enter a temperature alarm parameter.
3. Select **Save** to store the new parameters in the system configuration file.

Configuring the chilled water supply pressure alarm parameters

The current differential pressure parameters appear on the related buttons.

To configure the chilled water supply pressure low alarm parameters:

1. Select **Chilled Water Supply Pressure Low Alarm**.
A keypad appears.
2. Enter a differential pressure alarm parameter.
3. Select **Save** to store the new parameters in the system configuration file.

To configure the chilled water supply pressure high alarm parameters:

1. Select **Chilled Water Supply Pressure High Alarm**.
A keypad appears.
2. Enter a differential pressure alarm parameter.
3. Select **Save** to store the new parameters in the system configuration file.

Configuring the chilled water supply pressure alarm parameters

The current chilled water return pressure alarm parameters appear on the related buttons.

To configure the chilled water return pressure low alarm parameters:

1. Select **Chilled Water Return Pressure Low Alarm**.
A keypad appears.
2. Enter a chilled water return pressure alarm parameter.
3. Select **Save** to store the new parameters in the system configuration file.

To configure the chilled water return pressure high alarm parameters:

1. Select **Chilled Water Return Pressure High Alarm**.
A keypad appears.
2. Enter a chilled water return pressure alarm parameter.
3. Select **Save** to store the new parameters in the system configuration file.

Configuring the humidity alarm parameters

The current relative humidity parameters appear on the related buttons.

To configure the low humidity parameters:

1. Select the **Humidity Low Alarm**.
A keypad appears.
2. Enter a humidity alarm parameter.
3. Select **Save** to store the new parameters in the system configuration file.

To configure the high humidity parameters:

1. Select the **Humidity High Alarm**.
A keypad appears.
2. Enter a humidity alarm parameter.
3. Select **Save** to store the new parameters in the system configuration file.

Configuring the cold aisle temperature alarm parameters

The current temperature parameters appear on the related buttons.

To configure the cold aisle low temperature alarm parameters:

1. Select **Cold Aisle Low Alarm Temperature**.
A keypad appears.
2. Enter a temperature alarm parameter.
3. Select **Save** to store the new parameters in the system configuration file.

To configure the cold aisle high temperature alarm parameters:

1. Select **Cold Aisle High Alarm Temperature**.
A keypad appears.
2. Enter a temperature alarm parameter.
3. Select **Save** to store the new parameters in the system configuration file.

Configuring the hot aisle temperature alarm parameters

The current temperature parameters appear on the related buttons.

To configure the hot aisle low temperature alarm parameters:

1. Select **Hot Aisle Low Alarm Temperature**.
A keypad appears.
2. Enter a temperature alarm parameter.
3. Select **Save** to store the new parameters in the system configuration file.

To configure the hot aisle high temperature alarm parameters:

1. Select **Hot Aisle High Alarm Temperature**.
A keypad appears.
2. Enter a temperature alarm parameter.
3. Select **Save** to store the new parameters in the system configuration file.

Configuring the differential pressure alarm parameters

The current differential pressure parameters appear on the related buttons.

To configure the low differential pressure parameters:

1. Select **Difference Pressure Low Alarm**.
A keypad appears.
2. Enter a differential pressure alarm parameter.
3. Select **Save** to store the new parameters in the system configuration file.

To configure the high differential pressure parameters:

1. Select **Difference Pressure High Alarm**.
A keypad appears.
2. Enter a differential pressure alarm parameter.
3. Select **Save** to store the new parameters in the system configuration file.

Configuring the differential pressure alarm parameters

The current differential pressure filter parameters appear on the related buttons.

To configure the low differential pressure filter parameters:

1. Select **Differential Pressure Filter Low Alarm**.
A keypad appears.
2. Enter a differential pressure alarm parameter.
3. Select **Save** to store the new parameters in the system configuration file.

To configure the high differential pressure filter parameters:

1. Select **Differential Pressure Filter High Alarm**.
A keypad appears.
2. Enter a differential pressure alarm parameter.
3. Select **Save** to store the new parameters in the system configuration file.

Setting the humidifier control

HP recommends leaving the fans in **AUTO** mode during normal operation.

To set the humidifier control:

1. Select **Auto/Manual**.
2. Select **Save** to store the new parameters in the system configuration file.

To configure the humidifier setpoint percentage:

1. Select **Humidifier Setpoint (%)**.
A keypad appears.
2. Select **Save** to store the new parameters in the system configuration file.

Setting the fan controls for each fan control zone

The current fan speed appears on each fan control zone.

HP recommends leaving the fans in **AUTO** mode during normal operation.

To configure the fan speed:

1. Select the **Auto/Manual** in the fan control zone you want to change.
2. If you are setting the fan to Manual mode, select the fan speed (0-4) by pressing the corresponding number.
3. Select **Save** to store the new parameters in the system configuration file.

Advanced System Configuration screen

You can only access this screen after you have entered a service-level password.

The Advanced System Configuration screen displays fan current setpoints, calibration options, and other details about the HP POD 20c.

Advanced System Configuration 1722s active LOGOUT 

Startup

Reset Alarms After Startup Time (sec)

Calibrate

Calibrate Flowmeter

Calibrate Pressure Sensor

Power Configuration

Primary Current of STARLINE CTs

Secondary Current of STARLINE CTs

Primary Current of HOUSEPANEL CTs

Secondary Current of HOUSEPANEL CTs

Logging Configuration

Logging On/Off

Log Interval (sec)

Keep Log Files For (Months)

Panel Software: POD-5-C
Version: version 1.0.11

Perform the following tasks on this screen:

- Calibrate the flowmeter.
- Calibrate the chilled water and differential pressure sensors.
- View the power configuration.
- Set the logging configuration.
- Configure the HP POD 20c serial number.
- Configure the switchboard serial number.

You must select **Save** to store the parameter changes in the system configuration file. If you do not save your changes, the old parameters stored in the configuration file reload when the system starts.

Setting the start-up alarm reset delay

This option gives the POD time (in seconds) during a start-up to achieve at least minimum operating parameters prior to registering an alarm condition.

To set the amount of time prior to registering an alarm condition:

1. Select **Reset alarms after startup time (sec)**.
A keypad appears.
2. Enter the time in seconds you want the alarms to reset after startup.

3. Select **Save** to store the new parameters in the system configuration file.

Calibrating the flowmeter

This option enables flow rate calibration based on the value of a calibrated flow meter.

To calibrate the flowmeter:

1. Power down the HP POD 20c. For more information, see "Power down procedure (on page 73)."
2. Select **Flowmeter Calibration Factor**.
A keypad appears
3. Enter the calibration factor.
4. Select **OK**.
5. Select **Save** to store the new parameters in the system configuration file.

Calibrating the differential pressure sensors

This option is available only when all fans and the IT load are powered off and there is no air flowing inside the HP POD 20c.

To calibrate the chilled water pressure sensors:

1. Power down the POD. For more information, see "Power down procedure (on page 73)."
2. Set the fan speed for each fan control zone to **Manual** mode and 0% fan speed. For more information, see "Setting the fan controls for each fan control zone (on page 52)."
3. Open the doors for five minutes to equalize the pressure between the hot and cold aisles.
4. Select **Calibrate Differential Pressure Sensors**.
5. Select **Save**.
6. Set the fan speeds to Auto mode.

Setting the logging configuration

To log the power configuration information:

1. Select **Logging On/Off**.
2. Select **Save** to store the new parameters in the system configuration file.

To set the log interval:

1. Select **Log interval (sec)**.
A keypad appears.
2. Select **Save** to store the new parameters in the system configuration file.

To set the amount of time to keep power configuration log files:

1. Select **Keep Log Files For (Months)**.
A keypad appears.
2. Select **Save** to store the new parameters in the system configuration file.

Setting the switchboard serial number

To identify the switchboard connected to the HP POD 20c, set the switchboard serial number in the ECS:

1. Select **Switchboard S/N**.
A keypad appears.
2. Enter the switchboard serial number.
3. Select **Save** to store the new parameters in the system configuration file.

Setting the HP POD 20c serial number

If multiple HP POD 20c units are connected to the same facility BMS, enter each HP POD 20c serial number to monitor and display each HP POD 20c ECS independently through the facility BMS.

To set the HP POD 20c serial number in the ECS:

1. Select **POD S/N**.
A keypad appears.
2. Enter the HP POD 20c serial number. For more information, see "Parts and part number identification (on page 8)."
3. Select **Save** to store the new parameters in the system configuration file.

Loading default settings

This option enables you to revert the ECS system back to the factory settings.



CAUTION: Pressing this button causes all customized ECS settings to be lost.

To load the default settings:

1. Select **Load Default Settings**.
2. Select **OK**.

Controller Settings screen

You can only access this screen after you have entered a service-level password.

The Controller Settings screen displays the control setpoints for each major system component.

Controller Settings 1668s active LOGOUT 

PI Settings Temperature

	Zone 1	Zone 2	Zone 3
Temperature Setpoint (Hot Aisle)	42.0°C	42.0°C	42.0°C
PI Parameter P	0.010 %	0.010 %	0.010 %
PI Parameter I	500.0 ms	500.0 ms	500.0 ms
PI Integration Time	1000.0 ms	1000.0 ms	1000.0 ms

PI Settings Pressure

	Zone 1	Zone 2	Zone 3
Pressure Setpoint	0.040 mBar	0.040 mBar	0.040 mBar
PI Parameter P	0.500 %	0.500 %	0.500 %
PI Parameter I	500.0 ms	500.0 ms	500.0 ms
PI Integration Time	800.0 ms	800.0 ms	800.0 ms

BACK

Panel Software: P00-S-C
Version: version 1.0.11

You can set the following configuration options:

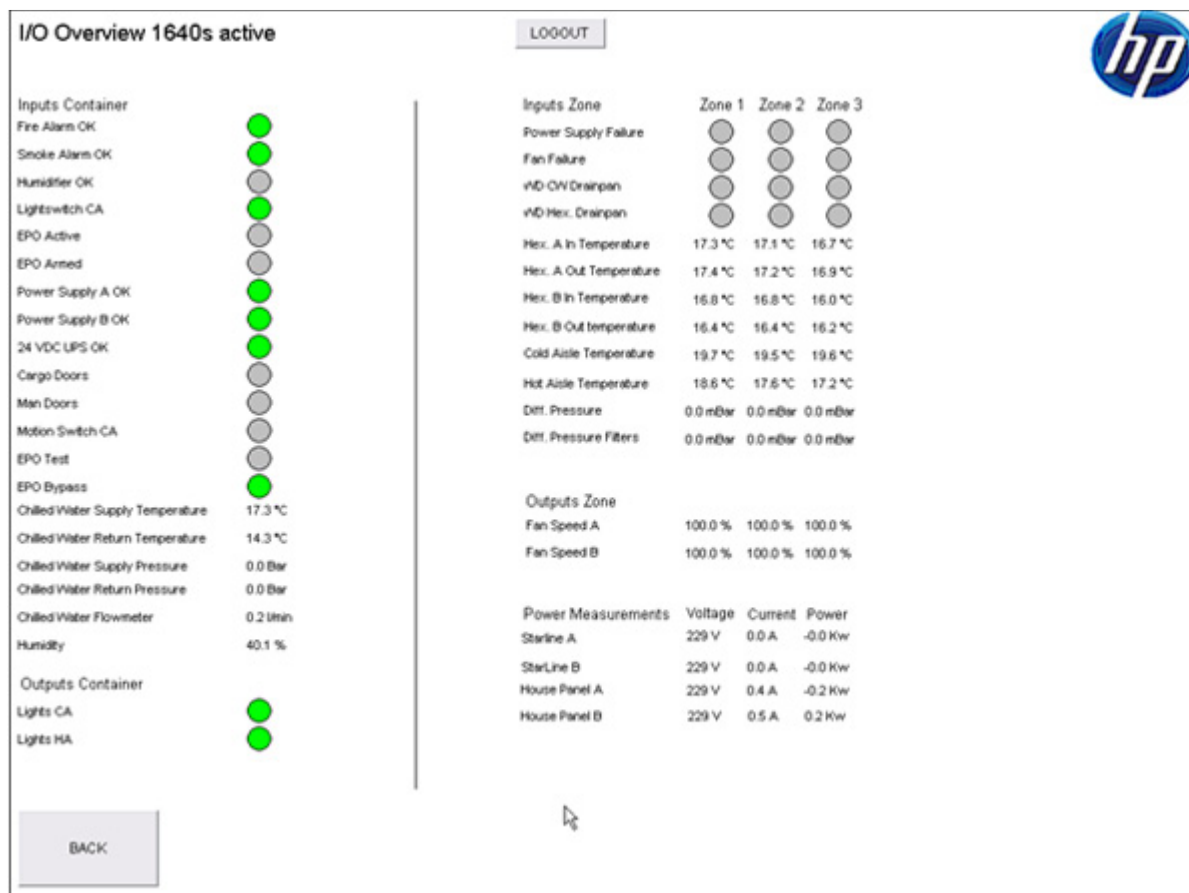
- PI settings temperature
- PI settings pressure

You must select **Save** to store the parameter changes in the system configuration file. If you do not save your changes, the old parameters stored in the configuration file reload when the system starts.

Item	Description
Temperature setpoint (hot aisle)	Sets the temperature setpoint for the hot aisle
Pressure setpoint	Sets the pressure setpoint
PI parameter P	Proportion gains influence the rate of change in the position of the flow control valve or the fan speed in order to reach the pre-determined setpoints
PI parameter I	Integral gains influence the rate of change in the position of the flow control valve or the fan speed in order to reach the pre-determined setpoints.
PI integration time	Used by the low pass filter to even the measurement values out

I/O Overview screen

The I/O Overview screen displays the status of inputs and outputs of all major system component alarms. For more information about the alarms, see "ECS alarms (on page 57)."



The ECS component icon colors indicate the component status:

- Green—No alarm conditions exist and the component is operating within normal parameters.
- Red—An alarm condition for that component exists or the component failed.

ECS alarms

The alarms pertaining to the health of the HP POD 20c and its components are relayed through the ECS.

Alarm	Meaning	Solution
Fan failure	One of the fans is not working.	See the <i>HP Performance Optimized Datacenter 20c Maintenance and Service Guide</i> or contact HP service if you are still within your service contract.
Sensor failure	One of the sensors is not working.	See the <i>HP Performance Optimized Datacenter 20c Maintenance and Service Guide</i> or contact HP service if you are still within your service contract.

Alarm	Meaning	Solution
Leak detection	The drain pan sensor detects water in the pan.	See the <i>HP Performance Optimized Datacenter 20c Maintenance and Service Guide</i> or contact HP service if you are still within your service contract.
Change filter	The return air filters are full.	Replace the return air filters. For more information, see the <i>HP Performance Optimized Datacenter 20c Maintenance and Service Guide</i> .
High temperature	The cold aisle temperature has surpassed the setpoint temperature.	1 Verify that you have water flowing into your HP POD 20c and the fans are operating. 2 Contact HP service if you are still within your service contract.
Low temperature	The cold aisle temperature is too low.	1 Verify that all components are operating normally. 2 Contact HP service if you are still within your service contract.
EPO	The EPO system activates and the HP POD 20c shut down.	1 Follow the emergency procedures for your facility. 2 After the emergency is cleared, reset the EPO and other HP POD 20c systems.
Differential pressure	The difference in pressure between the hot and cold aisles is above the setpoints.	1 Verify that the cold/hot aisle differential pressures are within the setpoints. 2 Contact HP service if you are still within your service contract.

Safety and access control alarms

Alarms pertaining to the safety of the HP POD 20c are (optionally) relayed through your building fire and access control dispatch.

Alarm	Meaning	Solution
Fire alarm*	The HP POD 20c detected a fire.	Activate the EPO. Follow the emergency procedures for your facility.
Access control alarm (optional)	An access control breach occurred.	Follow the emergency procedures for your facility.
EPO	The EPO system activated and the HP POD 20c shut down.	Follow the emergency procedures for your facility.

*The fire alarm is relayed to your building fire and access control dispatch only if you have connected your facility to the fire box (on page [67](#)).

Cooling system

HP POD 20c cooling system theory of operation

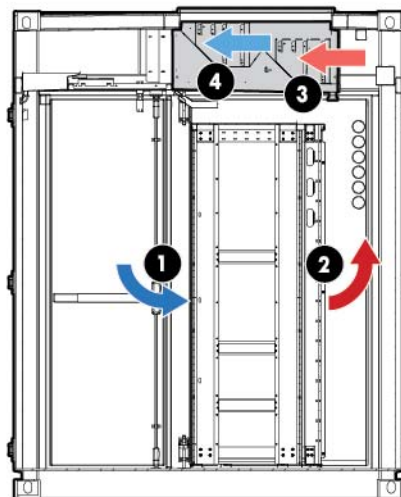
CAUTION: Using contaminated supply water can cause decreased cooling capacity or disruption in service. The supply water must meet the guidelines stated in the *HP Performance Optimized Datacenter 20c Site Preparation and Requirements Guide*. Damage caused by contaminated supply water is not covered by the warranty.

The HP POD 20c has six heat exchangers configured in three zones that maintain temperature and cool the equipment installed in the HP POD 20c. The HP POD 20c receives chilled water from your facility, cycles the water through the heat exchangers to cool the air, and then the fans circulate the cool air throughout the HP POD 20c.

A predetermined differential pressure setpoint between the hot aisle and the cold aisle is factory set. Do not alter the setpoint without consulting HP. The speed of the fan units is regulated to maintain the differential pressure between the hot aisle and the cold aisle. For more information, see "Fans (on page 62)."

The HP POD 20c chilled water flow rate is not regulated by the ECS system. Site control over chilled water flow rate is necessary to allow 454 lpm (120 gpm*).

For more information on the cooling system, see the *HP POD 20c Maintenance and Service Guide*.



*Measurement is in US gallons per minute.

Water supply temperature

The temperature of the water supplied to the HP POD 20c must be 13°C to 24°C (55°F to 75°F). Freezing water can cause a blockage and damage to the POD.

The minimum HP server inlet temperature is 10°C (50°F). For non-HP equipment, consult the documentation for that equipment.

Water quality requirements and specifications

The following are the water quality requirements and specifications:

- Closed-loop water must not contain any lime scale deposits or loose debris.
- The temperature of the chilled water supplied to the HP POD 20c must be 12°C to 24°C (55°F to 75°F).



CAUTION: Freezing water can cause a blockage and damage to the unit. In outside locations that are subject to freezing temperatures, an additive such as glycol might be necessary to lower the freezing point. However, since the heat transfer potential of water with glycol is lower, the HP POD 20c must be de-rated accordingly.



IMPORTANT: The chilled water system piping and heat exchangers must be drained completely, and then purged using compressed air when storing or transporting at or below freezing temperatures.



IMPORTANT: Operating the chilled water system at the higher end of the acceptable range decreases the overall thermal capacity of the POD.

Acceptable water quality specifications

Water must be maintained per the following acceptable water quality standards.

Parameter	Range
pH	8.0–10
Specific conductance at 25°C (77°F)	10–2500 μ mhos
Alkalinity ("M" as CaCO ₃)	150–1000 ppm
Sulfur (SO ₄)	0–150 ppm
Chloride (Cl)	0–100 ppm
Hardness (CaCO ₃)	0–350 ppm
Calcium hardness (CaCO ₃)	0–200 ppm
Magnesium hardness (CaCO ₃)	0–150 ppm
Copper (Cu)	< 0.20 ppm
Iron (Fe)	< 3.0 ppm
Aluminum (Al)	< 0.50 ppm
Sodium (Na)	0–1000 ppm
Silica (SiO ₂)	0–150 ppm
Zinc (Zn)	< 1.0 ppm
Manganese (Mn)	< 0.1 ppm
Phosphate Ortho- (PO ₄)	< 3 ppm
Bacteria	< 1000 CFU/ml
Suspended solids	< 10 ppm

If your water is out of range, consult a water quality expert.

The following table describes the chilled water system specifications for the HP POD 20c.

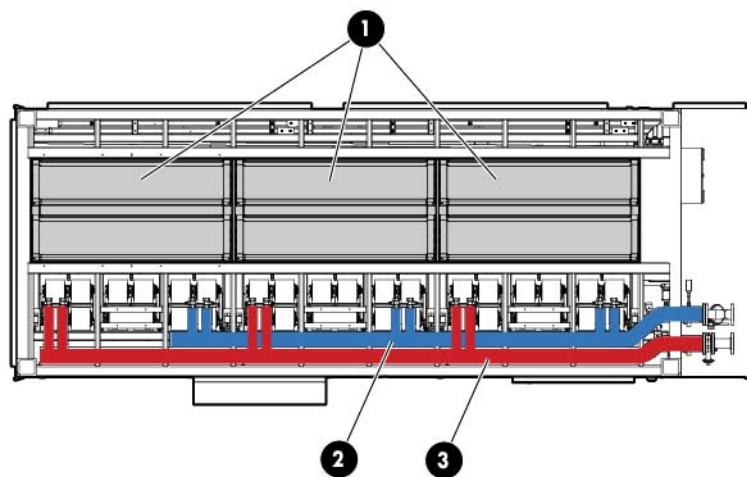
Feature	Specification
Facility input temperature to the HP POD 20c	12° to 24°C (55° to 75°F)
Max design pressure	1,034 kPa (150 psi)
HP POD 20c pressure drop	172.4 kPa (25 psi)
HP POD 20c water flow rate	454 lpm (120 gpm*)
Chilled water supply and return connections	Two DIN PN16 DN80 flanges

*Measurement is in US gallons per minute.

Cooling system components

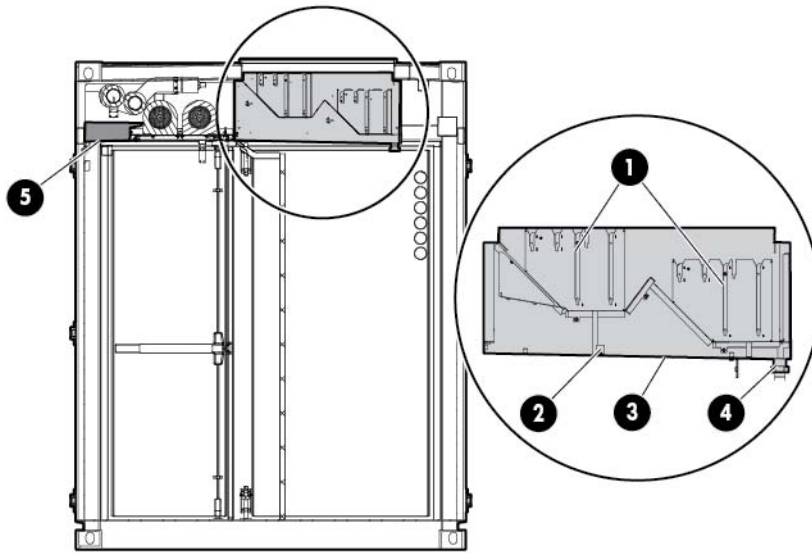
Each of the three heat exchanger area access hatches are rated NEMA 3R for outdoor use. The exterior of the hatches are coated with a durable finish to protect against corrosion. The access hatches are located on the roof of the POD. The heat exchangers can be accessed from the roof of the POD by removing one of the six access hatches.

Top view shown



Item	Component	Description
1	Heat exchangers	Uses chilled facility water to cool the air in the HP POD 20c
2	Chilled water supply header	Provides cooled chilled water from the site chilled water system to the heat exchangers
3	Chilled water return header	Provides heated chilled water to the return site chilled water system

End view shown



Item	Component	Description
1	Heat exchanger	Uses chilled facility water to cool the air in the HP POD 20c
2	Drain pan sensor	Detects excessive amounts of condensate in the drain pan and sends an alarm signal to the ECS
3	Drain pan	Collects and directs heat exchanger condensate to the condensate drain
4	Condensation drain	Removes condensation from the drain tray to the exterior of the HP POD 20c
5	Header drain pan	Provides leak detection for the chilled water supply and the chilled water supply return

Fans

HP POD 20c fans operate at variable speeds to maintain the following setpoints programmed in the ECS. The setpoints are maintained in the following order:

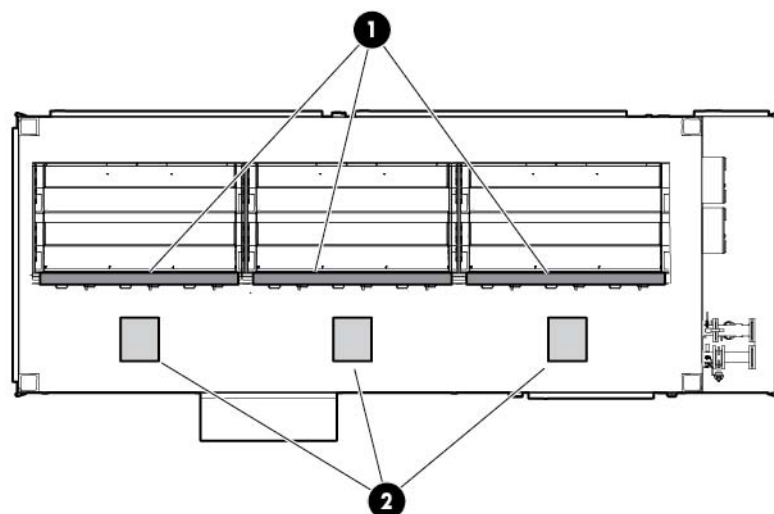
1. Differential pressure setpoint between the hot and cold aisles
2. Hot aisle temperature setpoint

The fan speed adjusts to maintain both setpoints. Do not manually adjust the fan speed.



IMPORTANT: HP recommends leaving the fans in AUTO mode during normal operation.

Depending on the IT equipment installed in your HP POD 20c, you can choose to change both default parameters to improve the overall efficiency of your system. To discuss the effects of changing these parameters for your specific HP POD 20c, contact HP ("[HP contact information](#)" on page 78).



Item	Component	Quantity	Description
1	Fan tray assemblies	3 banks of 6 (18 total) fans per zone	Circulates cool air from the heat exchangers throughout the HP POD 20c
2	Fan control and power supply assembly	3	Provides fan speed control, status, and DC power for the fans

Condensation management

CAUTION: To maintain accurate environmental conditions inside the HP POD 20c, do not leave the HP POD 20c doors open during operation.

The heat exchanger drip trays collect condensation that forms on the heat exchangers. This collected condensation drains out of the HP POD 20c through the heat exchanger condensate drains. HP recommends connecting the condensate drains on the HP POD 20c to a facility drain to prevent collection of water near the HP POD 20c.

The HP POD 20c has two 3.18 cm (1.25 in) condensate drain outlets located at both ends of the hot aisle of the HP POD 20c. The drain outlets are directly connected to the heat exchanger drip trays. The HP POD 20c main supply and return line is connected to the condensate drain line.

To avoid excessive buildup of condensation and to conserve energy, raise the cooling water temperature to above the dew point to manage condensation while maintaining the necessary cooling capacity.

Drains

WARNING: Water that drains around the HP POD 20c can cause a potential slip hazard. Use caution where slip hazards are present.

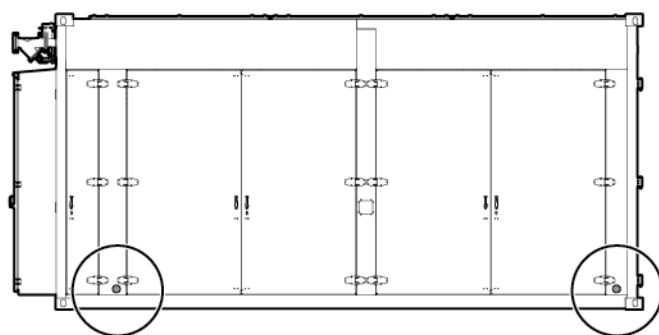
HP recommends connecting the condensate and humidifier drains from the HP POD 20c to a facility drain to prevent collection of water near the HP POD 20c. For more information on drain connections, see the *HP Performance Optimized Datacenter 20c Site Preparation and Requirements Guide*.

Hot aisle drains

Heat exchanger condensate drains

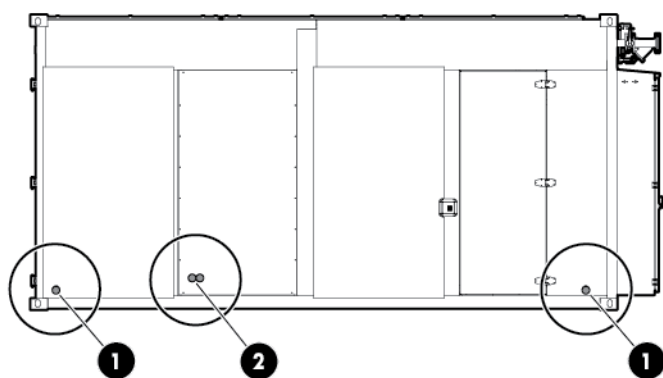
Side view shown

Water from natural condensation forms. Condensation from the heat exchangers flows to one of the two condensation drains located at each end of the hot aisle.



IMPORTANT: You might need to connect the HP POD 20c condensate drains directly to the local storm or sanitary drain, depending on the local jurisdictional requirements.

Cold aisle drains



Item	Component	Description
1	Chilled water supply and return header drain	Drains water from the chilled water supply and return header drip pans in the event a leak develops
2	Humidifier drain	Drains water from the humidifier



IMPORTANT: The humidifier drain contains concentrated impurities due to the humidification process and is extremely hot. You might need to connect this drain and the supply head drains directly to a local storm or sanitary drain, depending on the local jurisdictional requirements.

Leak detection

The HP POD 20c includes six heat exchanger condensate sensors. Three sensors are located in the drain trays below each set of heat exchangers, and three sensors are located in the header drain pans.

There should be no water in the chilled water supply and return header drain pan, and the drain pan should always remain dry.

Some amount of condensation water can always be expected in the heat exchanger drain pans. If an excessive amount of condensation water accumulates in a drain pan, an alarm is triggered and sent through the HP POD 20c ECS, indicating a possible leak.

For more information on leak detection, see the *HP Performance Optimized Datacenter 20c Maintenance and Service Guide*.

IT networking and communications

Networking

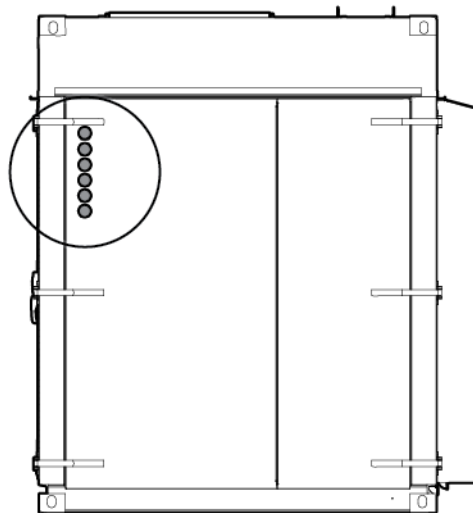
Connecting the HP POD 20c to the facility network is a vital part of ensuring the functionality of the various communication systems. See the *HP Performance Optimized Datacenter Networking Guide* for more information.

All connections are the responsibility of the customer. For configuration and installation instructions, consult with HP.

Connection portals

Networking and connection portals are located on the cargo end of the HP POD 20c. Each HP POD 20c has six 6.35-cm (2.5-in) portals for customer data connection. These portals are provided to allow the customer to make connections to the HP POD 20c.

End view shown

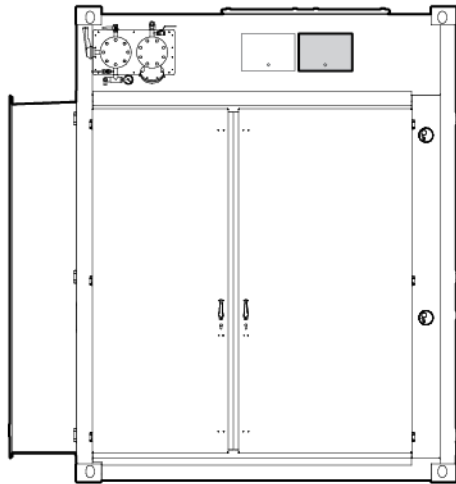


Demarcation box

The following communication connections between the customer facility and the HP POD 20c are made through the demarcation box:

- ECS communication
- Access control communication
- Telephone

Front view shown

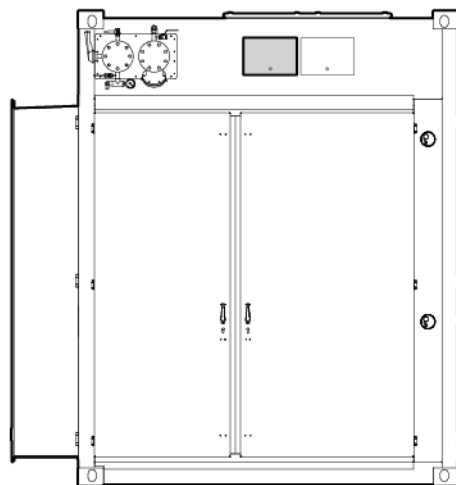


You must make the connections between the facility and the HP POD 20c. For configuration and installation instructions, consult with HP.

Fire box

The communication connections between the fire system and the HP POD 20c are made through the fire box.

Front view shown



You must make the connections between the facility and the HP POD 20c. For configuration and installation instructions, consult with HP.

Optional components

Fire protection system

The fire protection system is a HP POD 20c self-contained system, with no connection to your ECS. The fire protection system consists of 3M Novec 1230, a clean agent fire suppressant, eliminating the need for additional water to be connected to the HP POD 20c in case of a fire emergency.

Humidifier

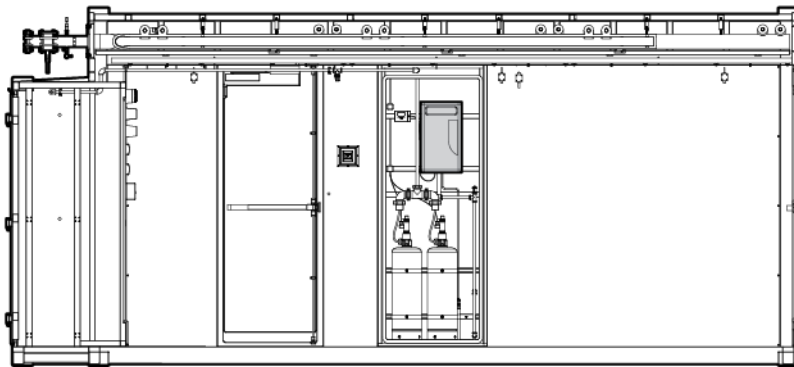
The humidifier option maintains the humidity in the HP POD 20c within a set range according to ASHRAE standards.



IMPORTANT: The humidifier is required if you want the POD to remain within ASHRAE recommended or allowable standards.

Maintaining the humidity helps to minimize static electricity within the HP POD 20c.

Side view shown



Controlled access

The HP POD 20c controlled access option adds magnetic locks and 12-digit keypads to the hot and cold aisle dynamic doors. This option enables you to provide controlled access to the hot and cold aisle without the need for keys.

Power up procedure

Standard HP POD 20c power up procedure

This procedure is for your reference only and assumes that the POD is fully commissioned and powered up by HP before being turned over to you.

Before beginning the power up procedures in this section, verify that the POD is not in operation and that the internal ambient temperature of the POD is greater than 10°C (50°F). If the internal ambient temperature of the POD is less than 10°C (50°F), see "Cold weather HP POD 20c power up procedure (on page 70)."

This process helps to ensure personnel safety during the electrical start up of the HP POD 20c.



WARNING: To avoid risk of personal injury or loss of life, do not open an energized POD electrical cabinet without an energized work permit and appropriate PPE.

Power up checklist

Site electrical

Verify that all site POD feeder supply breakers are open.

Site mechanical

Verify that the POD supply and return isolation valves are closed.

POD mechanical

Verify that the POD chilled water return butterfly isolation valve is open.

POD electrical

- Hot aisle—Verify that all IT power drop box breakers on the power tap boxes are open.
- Cold aisle:
 - a. Close all breakers and fuses within the control cabinet.
 - b. Close and latch the ECS cabinet.
 - c. Position the EPO system (on page 18) to Armed (White) or Bypass (Green).
 - d. Verify that all EPO activation buttons are in the reset position (not depressed).
 - e. Position the 24V DC power switch to On.
- Main power feed cabinet:
 - a. Close main power feed breakers A and B.
 - b. Verify power surge fuses are installed.
- House power and critical IT power cabinets:
 - a. Close all fuses in the house power and critical IT power cabinets.
 - b. Close all non-spare breakers in the house power and critical IT power cabinets.
 - c. Close and lock both house power and transformer cabinet doors.

Standard power up procedure

Perform the following procedures in the exact order in which they are listed.

Site electrical

Close all POD site power feeder breakers and monitor for any effects that are not standard.

Site chilled water

1. Open the POD supply chilled water isolation valve.
2. If necessary, vent the air from the chilled water return header.
3. Open the POD return chilled water isolation valve.
4. Verify that audible flow noises are present.

ECS and EPO

Verify the following on using the ECS touchscreen and EPO indicators:

- The ECS panel is operational and displays the user interface.
- The POD lighting is operational.
- The EPO system is set to Armed (White) or Bypass (Green).

POD operation

1. On the ECS touchscreen, verify that all system components are operational (green) and no alarm conditions exist.
2. On the ECS touchscreen, verify that all system parameters are operating normally.
3. On the ECS touchscreen, verify that the POD chilled water flow rate is established on the flow rate indicator.
4. In the hot aisle, close the power drop box breakers for each rack and ensure that the IT equipment is operating.
5. In the cold aisle, monitor the flow control position, chilled water flow, and POD temperatures.
6. Wait five minutes to allow the system to stabilize.

The HP POD 20c is now fully operational and the control system automatically controls the fan and the flow control valve position.

Cold weather HP POD 20c power up procedure

This procedure is for your reference only and assumes that the POD was fully commissioned and powered up by HP before being turned over to you.

Before beginning the power up procedures in this section, verify that the POD is not in operation and that the internal ambient temperature of the POD is less than 10°C (50°F). If the internal ambient temperature of the POD is greater than 10°C (50°F), see "Standard HP POD 20c power up procedure (on page 69)."



IMPORTANT: The minimum acceptable inlet temperature for IT equipment is 10°C (50°F).

This process helps to ensure personnel safety during the electrical start up of the HP POD 20c.



WARNING: To avoid risk of personal injury or loss of life, do not open an energized POD electrical cabinet without an energized work permit and appropriate PPE.

Cold weather power up checklist

Site electrical

Open (verify open) all site POD feeder supply breakers.

Site mechanical

Verify that the POD supply and return isolation valves are closed.

POD mechanical

Open (verify open) POD chilled water return butterfly isolation valve.

POD electrical

- Hot aisle—Verify that all IT power drop box breakers on the power tap boxes are open.
- Cold aisle:
 - a. Close all breakers and fuses within the control cabinet.
 - b. Close and latch the ECS cabinet.
 - c. Position the EPO system (on page 18) to Armed (White) or Bypass (Green).
 - d. Verify that all EPO activation buttons are in the reset position (not depressed).
 - e. Position the 24V DC power switch to On.
- Main power feed cabinet:
 - a. Close main power feed breakers A and B.
 - b. Verify power surge fuses are installed.
- House power and critical IT power cabinets:
 - a. Close all fuses in the house power and critical IT power cabinets.
 - b. Close all non-spare breakers in the house power and critical IT power cabinets.
 - c. Close and lock both house power and transformer cabinet doors.

Standard power up procedure

Perform the following procedures in the exact order in which they are listed.

Site electrical

Close all POD site power feeder breakers and monitor for any effects that are not standard.

ECS and EPO

Verify the following using the ECS touchscreen and EPO indicators:

- The ECS panel is operational and displays the user interface.
- POD lighting is operational.

- The EPO system is set to Armed (White) or Bypass (Green).

Site chilled water

1. Open the POD supply chilled water isolation valve.
2. If necessary, vent the air from the chilled water return header.
3. Open the POD return chilled water isolation valve.
4. Verify audible flow noises are present.



IMPORTANT: To allow the POD ambient temperature to be raised in a controlled manner, open the chilled water supply and return isolation valves to enable 454.25 lpm (120 gpm*) at a temperature of 13°C to 24°C (55°F to 75°F) to flow through the heat exchangers and allow the circulation fans to bring the ambient temperature to >10°C (50°F).

- Portable heaters can be used to disperse supplemental heat uniformly throughout the POD.
- Electric portable heaters must be powered from an outside source.

*Measurement is in US gallons per minute.

POD heating procedure

1. On the ECS touchscreen, verify that all system components are operational (green) and no alarm conditions exist.
2. On the ECS touchscreen, verify that the POD chilled water flow rate is established on the flow rate indicator.
3. Take manual control of the fans to the preferred speed to circulate the warm air in the POD.
4. Determine the hot aisle temperature:
 - o If the hot aisle temperature is at or above -25°C (13°F), continue to the next step.
 - o If the hot aisle temperature is not at or above -25°C (13°F), continue monitoring the hot aisle temperature until it reaches -25°C (13°F) and continue this warm up procedure for 60 minutes before proceeding.
5. Record the cold aisle temperature that displays on the ECS. The recorded temperature is the starting temperature of the servers.



IMPORTANT: With non-operating servers, the temperature rate of change should not exceed 20°C (68°F) per hour. At higher elevations, the rate of change must be reduced by 1°C (34°F) for every 305 m (1,000 ft) above sea level.

6. When the cold aisle temperature reaches a minimum of 10°C (50°F), maintain the temperature for at least 60 minutes before proceeding.



CAUTION: Do not continue the start up procedures unless the fans are in **AUTO** mode.

7. Set all fans to **AUTO** mode.

POD operation

1. In the hot aisle, close the power drop box breakers for each rack and ensure that the IT equipment is operating.
2. In the cold aisle, monitor the flow control position, chilled water flow, and POD temperatures.

3. Wait five minutes to allow the system to stabilize.

The HP POD 20c is now fully operational and the control system automatically controls the fans and the flow control valve position.

Power down procedure

1. Power down all IT equipment.
2. Open all POD power drop box breakers.
3. Monitor the system parameters and allow the POD to cool to an acceptable temperature. Be sure that the cold aisle temperature does not fall below 10°C (50°F.)
4. Close the POD return chilled water isolation valve.
5. Close the POD supply chilled water isolation valve.
6. Open the POD main power feed breakers.
7. Unlock the POD house power and critical IT power cabinets.
8. Open all breakers in the POD power cabinets A and B.
9. Unlock the POD main power feed cabinet.
10. Open all breakers in the POD main power feed cabinet.

The HP POD 20c is now powered down and all breakers are ready for standard or cold weather power up.

Specifications

General HP POD 20c specifications

Features	Specifications
Overall dimensions	• Height—3.05 m (10 ft) • Length—6.10 m (20 ft) • Width—2.43 m (7.97 ft)
Weight ¹	• Empty—7,711 kg (17,000 lb) • Maximum fully loaded—22,680 kg (50,000 lb)
Maximum power ²	288 kW
Power input voltage	380-415 V, 3-phase, 4-wire
Power input current	2 x 320 A electrical busways 3-phase, 4-wire feeders
Maximum rack quantity	10 racks
Rack Units (RU) per rack	50 RU
Rack Units (RU) total	500 RU
Average capacity per rack (kW)	30 kW
Peak rack capacity	69 kW
Voltage to rack	200-240 VAC
Minimum quantity of PDUs per HP POD 20c	10 (one per rack)
Maximum quantity of PDUs per HP POD 20c	20 (two per rack)
Maximum power per PDU	30A = 17 kW; 60A = 34 kW
Network supported	• Bulk cable pass-through-fiber • Bulk cable pass-through-copper • External rated DEMARC box

¹The empty weight includes the HP POD 20c structure, empty racks, PDUs, and drop boxes. It does not include IT equipment.

²The maximum power depends on the exact installation and power configuration in your POD. The HP POD 20c is electrically limited to 288 kW.

Electrical specifications

Electrical busway system information

Feature	Specification
Number of busways	2
Frequency	50-60 Hz
Amps (per busway)	200 A
Voltage (per busway)	380-415 VAC Wye
Grounding	Copper
Busway configuration	3-phase + neutral + equipment ground

Fire alarm panel connections

The electrical layout of the fire alarm system is as described in the schematic drawing supplied with the HP POD 20c.

Water specifications

The following table describes the chilled water system specifications for the HP POD 20c.

Feature	Specification
Facility input temperature to the HP POD 20c	12° to 24°C (55° to 75°F)
Max design pressure	1,034 kPa (150 psi)
HP POD 20c pressure drop	172.4 kPa (25 psi)
HP POD 20c water flow rate	454 lpm (120 gpm*)
Chilled water supply and return connections	Two DIN PN16 DN80 flanges

*Measurement is in US gallons per minute.

Rack specifications

Standard HP POD 20c racks (AT978A)

Feature	Specification
U height	50U
Width	54.6 cm (21.5 in)
Depth	99 cm (39 in)*
Maximum load weight	1,360.7 kg (3,000 lb)

*This specification indicates the maximum clearance for the cold aisle. Equipment cannot exceed this measurement.

Thermal and air flow performance

Maximum thermal and air flow performance parameters	HP POD 20c specification
Air temperature—Inlet to rack-mounted components	Dependent on IT configuration and chilled water inlet temperature
Chilled water temperature	12°C to 24°C (55°F to 75°F)
Total rack-mounted component air flow	Variable as required to maintain hot aisle setpoint temperature and dependent on IT configuration
Heat rejection capacity	300 kW

Environmental specifications

Feature	Specification
Operating temperature	-28°C to 54°C (-18°F to 130°F)
Non-operating temperature*	-29°C to 54°C (-20°F to 130°F)

Feature	Specification
Operating humidity	• 0% to 100% external • 10% to 90% non-condensing internal
Non-operating humidity*	• 5% to 95% relative non-condensing • 39°C (102°F) maximum wet bulb temperature
Operating altitude	-76.2 m to 3,048 m (-250 ft to 10,000 ft)
Non-operating altitude	-76.2 m to 9,144 m (-250 ft to 30,000 ft)

*For non-operating specifications, consider the temperature of computer and IT equipment inside the HP POD 20c.

Maintenance

Periodic maintenance

Perform periodic inspections to ensure that the HP POD 20c continues to perform according to design parameters. During periodic inspections, pay special attention to electrical connections and wiring.

For more specific maintenance information, see the *HP Performance Optimized Datacenter 20c Maintenance and Service Guide*.

Sample HP POD 20c maintenance schedule

For detailed maintenance information and schedules, consult with HP services.

The following table is a sample maintenance schedule for an HP POD 20c. For more detailed maintenance information, see the *HP Performance Optimized Datacenter 20c Maintenance and Service Guide*.

Component to be inspected	Frequency
Electrical connections and wiring—Visual	Every 30 days
Electrical connections and wiring—Thermal scans	Every 180 days
Condensation and drainage system (leaks)—Visual	Every 30 days
Condensation and drainage system (leaks)—Functional	Every 90 days
Busway interconnects (tightened)	Every 180 days
EPO system	Every 180 days
Third-party OEM components (fire alarm and suppression system, humidifier, and so on)	For more information about the components, see the <i>Operation and Maintenance manual for the HP Performance Optimized Datacenter 20c</i> .

Contacting HP

Before you contact HP

Be sure to have the following information available before you call HP:

- Active Health System log (HP ProLiant Gen8 or later products)
Download and have available an Active Health System log for 3 days before the failure was detected. For more information, see the *HP iLO 4 User Guide* or *HP Intelligent Provisioning User Guide* on the HP website (<http://www.hp.com/go/ilo/docs>).
- Onboard Administrator SHOW ALL report (for HP BladeSystem products only)
For more information on obtaining the Onboard Administrator SHOW ALL report, see the HP website (<http://www.hp.com/go/OAlog>).
- Technical support registration number (if applicable)
- Product serial number
- Product model name and number
- Product identification number
- Applicable error messages
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level

HP contact information

For United States and worldwide contact information, see the Contact HP website (<http://www.hp.com/go/assistance>).

In the United States:

- To contact HP by phone, call 1-800-334-5144. For continuous quality improvement, calls may be recorded or monitored.
- If you have purchased a Care Pack (service upgrade), see the Support & Drivers website (<http://www8.hp.com/us/en/support-drivers.html>). If the problem cannot be resolved at the website, call 1-800-633-3600. For more information about Care Packs, see the HP website (<http://pro-aq-sama.houston.hp.com/services/cache/10950-0-0-225-121.html>).

Regulatory information

HP POD 20c regulatory compliance

The HP POD 20c complies with the following regulatory standards.

Standard	Certification level	Standard title
IEC/EN 60950	"Intertek Tested and Certified"	• IEC/EN 60950—<i>Standard for Safety Information Technology Equipment, Part 1: General Requirements</i>, Issue: 2006 • IEC/EN 60950—<i>Standard for Safety Information Technology Equipment, Part 22: Equipment to be Installed Outdoors</i>, Issue: 2006
IBC 2009	Designed to Comply With the applicable requirements	2009 <i>International Building Code</i> , © 2010 International Code Council, Inc.

Safety and IEC compliance

The HP POD 20c is examined, tested, and found to be in compliance with IEC/EN 60950 Part 1 and Part 22 as an Information Technology Product. For more information, see "HP POD 20c regulatory compliance (on page 79)."

The HP POD 20c is not suitable for long-term human occupancy. The HP POD 20c is Listed as a Product that provides service access areas for periodic maintenance and service. These areas must be used only by owner-authorized and qualified personnel who are trained in the maintenance and service of the HP POD 20c components.



IMPORTANT: Before installing the HP POD 20c, consult your local Authorities for applicable regulations and to review site-specific location guidelines. If needed, obtain any necessary permits.

Additional considerations for safety and Electrical compliance are as follows:

- The HP POD 20c is Certified as an Information Technology Product to IEC/EN 60950 Part 1 and Part 22.
- The HP POD 20c is evaluated as a "non-inhabitable product" that provides "service access" areas for customer-authorized, qualified, and trained service personnel.
- The electrical connections of the HP POD 20c are evaluated as feeder connections for connection to an existing facility, and are not suitable as "service entrance" for connection to the utility.
- The HP POD 20c is designed for stationary installation outdoors in a Pollution Degree 3 environment, in restricted access locations, with field wiring terminals provided for permanent supply connections.
- The HP POD 20c meets the following ratings.

Feature	Specification
Category	Rated Overvoltage Category III
Protection	Surge protection device

Feature	Specification
Class	Class 1
Ambient temperature	2°C to 54°C (35.6°F to 129.2°F)
Relative humidity	0% to 100% humidity

- As part of the overall certification, relevant sections of the International Building Code have been applied as part of the design and evaluation. The current design supports wind loads up to 144.84 kph (90 mph).

Safety and regulatory compliance

For safety, environmental, and regulatory information, see *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products*, available at the HP website (<http://www.hp.com/support/Safety-Compliance-EnterpriseProducts>).

Turkey RoHS material content declaration

Türkiye Cumhuriyeti: EEE Yönetmeliğine Uygundur

Ukraine RoHS material content declaration

Обладнання відповідає вимогам Технічного регламенту щодо обмеження використання деяких небезпечних речовин в електричному та електронному обладнанні, затвердженого постановою Кабінету Міністрів України від 3 грудня 2008 № 1057

Warranty information

HP ProLiant and X86 Servers and Options (<http://www.hp.com/support/ProLiantServers-Warranties>)

HP Enterprise Servers (<http://www.hp.com/support/EnterpriseServers-Warranties>)

HP Storage Products (<http://www.hp.com/support/Storage-Warranties>)

HP Networking Products (<http://www.hp.com/support/Networking-Warranties>)

Glossary

BMS

building management system

branch circuit

The conductors and components following the last overcurrent protective device protecting a load.

control circuit

A circuit that carries the electric signals directing the performance of a controller, and which does not carry the main power circuit.

control transformer

A transformer whose secondary supplies power to control circuit devices only (excluding loads).

cover

An unhinged portion of an enclosure that covers an opening.

CSC

container safety convention

disconnect switch

A device that disconnects all ungrounded conductors of a circuit from their electrical supply.

door

A hinged portion of an enclosure that covers an opening.

ECS

environmental control system

EHS

Environmental, Health, and Safety

EPO

emergency power off

equipment

A general term, including fittings, devices, appliances, luminaires, apparatus, machinery, and the like used as a part of, or in connection with, a modular data center. (Source: NEC.)

fuse, branch circuit type

A fuse of Class CC, G, H, J, K, L, R, and T. These fuses are able to provide branch circuit protection.

fuse, supplementary type

Miscellaneous type and miniature type fuses. These fuses are able to provide supplementary protection only.

labeled

Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

listed

Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards potential of not more than 42.4 V (DC or peak) supplied by a primary battery or by an isolated secondary circuit, and where the current capacity is limited by an overcurrent device, such as a fuse, or by the inherent capacity of the secondary transformer or power supply, or a combination of a secondary winding and an impedance. A circuit derived from a line-voltage circuit by connecting a resistance in series with the supply circuit to limit the voltage and current is not identified as a low-voltage limited energy circuit. or has been tested and found suitable for a specified purpose.

The means for identifying listed equipment might vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. Use of the system employed by the listing organization allows the authority having jurisdiction to identify a listed product.

overload protection

Protection required for motor circuits that will operate to prohibit excessive heating due to running overloads and failure to start.

PDU

power distribution unit

PLC

programmable logic controller

PPE

personal protective equipment

RU

rack units

structure

Enclosure of sufficient size to enable entry of personnel.

UPS

uninterruptible power system

Documentation feedback

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